Sex, gender, and pain: The psychosocial context of pain relief

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"A gender-equal society would be one where the word 'gender' does not exist: where everyone can be themselves."

-Gloria Steinem

Abstract

Pain is a fundamental aspect of the human experience, but there is great variability in experiences of pain. Notably, there is variability based on sex category (male or female, based on biological differences in chromosomes, hormones, and sex organs; Unger, 1979), with women reporting pain more frequently, in more bodily locations, and of longer duration than men (Melchior, Poisbeau, Gaumond, & Marchand, 2016). Gender is a psychosocial construct which may help to explain sex differences, referring to the psychological and sociocultural attributes typically associated with being male or female, such as masculinity and femininity. Whilst gender has received some attention in relation to pain expression, few investigations have explored gender in relation to pain coping. Due to the complexities of studying coping, I decided to focus on one aspect of coping: attempts to relieve pain, rather than to tolerate or endure pain.

My primary research aim was to explore the challenges that gender roles, norms, and stereotypes might pose to men and women seeking pain relief. Throughout this thesis I present a literature review and six empirical studies designed to achieve this aim. Collectively, my findings show that gender is indeed relevant to pain relief contexts, potentially more so than sex. In particular, it seems that masculinity poses more barriers to 'effective' pain relief than femininity does. Masculinity favours ignoring the pain, and discourages consulting a healthcare professional, however the relationship between masculinity and analgesic consumption seems less clear. Whilst femininity seems less connected to how women are expected to relieve pain, there was some evidence that femininity encourages analgesic consumption, but at times can pose barriers to healthcare utilisation. My results describe the gendered context in which men and women experience pain and the associated norms and expectations, thus having implications for pain research and management.

List of Abbreviations

CFNI-45	Conformity to Feminine Norms Inventory-45
CMNI-46	Conformity to Masculine Norms Inventory-46
CSQ	Pain Coping Strategies Questionnaire
EFS	Externally Focused Strategies
IFS	Internally Focused Strategies
ORM	Other-Related Motivation
PAQ	Personal Attributes Questionnaire
PCA	Principal Component Analyses
PCQ	Pain Coping Questionnaire
PRMS	Pain Relief Motivation Scale
PRSS	Pain Relief Strategies Scale
SDT	Self-Determination Theory
SRM	Self-Related Motivation

Chapter One: Literature Review

Sex, gender, and pain: the psychosocial context of pain relief

Introduction

Pain is a fundamental aspect of the human experience, and an unavoidable part of life for most individuals. Pain can be extremely disruptive and negatively impact many aspects of one's daily life, particularly work and social lives (Crombie, Croft, Linton, LeResche, & Von Korff, 1999). In the UK alone, almost half of the population are thought to experience chronic pain, estimating approximately 28 million adults, a number set only to increase with our aging population (Fayaz, Croft, Langford, Donaldson, & Jones, 2016). There is also a great deal of variation in experiences of pain, and the impact of pain on mental and physical health, cognitive impairments, and ability to care for oneself varies with pain severity (Pitcher, Von Korff, Bushnell, & Porter, 2018). The costs of pain also extend far beyond the individual, with an estimated economic cost of between $560 billion to $635 billion in 2008 for chronic pain in the United States alone (Gaskin & Richard, 2012). Moreover, such costs are anticipated to rise with increasing longevity (Smith, Davis, Stano, & Whedon, 2013).

Although the costs and consequences of pain are well-documented, the experience of pain appears to vary across individuals, and understanding this variability is crucial to improving pain management. Researchers have attempted to untangle the complex variability of pain and have found striking evidence to suggest that a substantial amount of pain variability may be related to the sex of an individual; in other words, whether they are male or female. Recently, Melchior et al. (2016) reviewed the literature exploring sex differences in pain using a range of methods, including laboratory pain induction, brain imaging, animal studies, chronic pain statistics, and autonomic nervous system functioning. They found consistent evidence that even when excluding gynaecologic and reproductive symptoms, women report more severe and frequent pain than men, as well as pain in more sites and of longer duration. Research has also consistently shown that most pain conditions are more prevalent in women than men, although not without exception (see Berkley, 1997, for a review).

In addition to consistent sex differences in clinical pain, there is also consistent evidence of sex differences in laboratory-induced pain threshold and tolerance. Pain threshold refers to the point at which an individual reports a stimulus as painful, whilst pain tolerance refers to the point at which the participant withdraws from said pain stimulation

(Schmidt & Willis, 2006). Research has been fairly consistent in demonstrating greater pain tolerance among men compared to women across a range of modalities, including cold pressor pain (Alabas, Tashani, & Johnson, 2012; Dixon, Thorn, & Ward, 2004; Edwards, Haythornthwaite, Sullivan, & Fillingim, 2004; Fowler, Rasinski, Geers, Helfer, & France, 2011; Keogh, Hatton, & Ellery, 2000; Lowery, Fillingim, & Wright, 2003; Myers, Robinson, Riley III, & Sheffield, 2001; Sanford, Kersh, Thorn, Rich, & Ward, 2002; Thorn et al., 2004; Westcott, Huesz, Boswell, & Herold, 1977), thermal heat pain (Bragdon et al., 2002; Defrin, Shramm, & Eli, 2009; Edwards et al., 2004; Fillingim, Edwards, & Powell, 1999), electrical stimulation (Pool, Schwegler, Theodore, & Fuchs, 2007; Reidy, Dimmick, MacDonald, & Zeichner, 2009), pressure pain (Ayesh, Jensen, & Svensson, 2007; Otto & Dougher, 1985), ischemic pain (Fillingim & Maixner, 1995), and strain gauge (Stevens, 1994). However, not all studies have found higher pain tolerance in men, for example Bragdon et al. (2002) and Edwards et al. (2004) found no significant sex differences in ischemic pain tolerance.

There is also research demonstrating sex differences in pain threshold, with men demonstrating higher thresholds than women for cold pressor pain (Alabas, Tashani, & Johnson, 2012; Edwards et al., 2004; Keogh, Bond, Hanmer, & Tilston, 2005; Lowery et al., 2003), thermal heat pain (Edwards et al., 2004; Fillingim et al., 1999), and pressure pain (Chesterton, Barlas, Foster, Baxter, & Wright, 2003; Garcia, Godoy-Izquierdo, Godoy, Perez, & Lopez-Chicheri, 2007; Kröner-Herwig, Gaßmann, Tromsdorf, & Zahrend, 2012; Otto & Dougher, 1985). However, some studies have also failed to find sex differences in pain threshold. Whilst non-significant sex differences in pain tolerance are mainly apparent for ischemic pain, non-significant sex differences in threshold have been found across a range of modalities, including electrical shock pain (Ayesh et al., 2007; Pool et al., 2007), thermal heat pain (Defrin et al., 2009), cold pressor pain (Keogh et al., 2000), pressure pain (Ayesh et al., 2007; Nie, Arendt-Nielsen, Andersen, & Graven-Nielsen, 2005), as well as ischemic pain (Bragdon et al., 2002; Edwards et al., 2004; Fillingim & Maixner, 1995).

Research has also found sex differences in other pain characteristics, with women reporting higher pain intensity, pain unpleasantness, and sensory pain (Kröner-Herwig et al., 2012; Vierhaus, Lohaus, & Schmitz, 2011) than men. Taken together, the literature rather consistently suggests that females have lower pain threshold and tolerance than males, and tend to report higher pain intensities across a range of noxious stimuli modalities. Despite some variation, effect sizes tend to range from moderate to large, with differences generally attributed to methodological differences and variation in sample size (Berkley, 1997;

Fillingim, King, Ribeiro-Dasilva, Rahim-Williams, & Riley, 2009; Riley III, Robinson, Wise, Myers, & Fillingim, 1998).

Over the years, several biological mechanisms have been proposed to explain sex differences in pain reports, including structural and functional differences between males and females, such as genetic and hormonal differences (Melchior et al., 2016; Unruh, 1996). However, biological differences alone fail to fully explain such sex differences, leading to an increased focus on psychosocial factors. As a result, there is now a large body of research exploring how men and women cope with pain, which will be reviewed later in this chapter. However, as will become apparent, there are many inconsistences, possibly due to the broad definition of coping, and the focus on differences between rather than within the sexes. From a research perspective, categorising people based on whether they are male or female can sometimes be superficial; neglecting the ways in which women might differ to one another, men to one another, and the ways in which men and women might be more similar than different.

One way of better understanding within-sex variability is to take a gendered approach. This involves considering psychosocial factors associated with men and women, such as masculinity and femininity. This can provide a more comprehensive understanding of an individual and their behaviour than categorical sex alone can provide. Use of pain relief, for example, is likely to be dictated by more than whether an individual is male or female. Psychological factors such as emotions and beliefs, and sociocultural factors such as behavioural norms and expectations are also likely to influence pain relief choices. And as with most things, these can be gendered. Thus, the focus of this thesis is on how psychosocial factors related to sex and gender might influence the ways in which men and women use pain relief. As I anticipated gender could be implicated in men and women's use of pain relief for both acute and chronic pains, I place no constraints on the types of pains explored throughout this thesis.

In the remainder of this chapter I will provide definitions and models for the key concepts within this thesis, and then review the extant literature investigating sex and gender differences in coping with pain generally. I shall then close this chapter with my research questions. Following this, I will present the development and psychometric testing of two new measures (Chapter 2), six empirical studies presented within four chapters (Chapters 3-

6), and a discussion (Chapter 7) in which I triangulate my findings and make recommendations for applications and future research.

Definitions and Models of Pain

The complexity of the experience of pain is inherent in attempts to define it. The International Association for the Study of Pain's official definition is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Merskey & Boduk, 1994, p. 210). More recently, a new definition has been proposed by Williams and Craig (2016) who argue that a more suitable definition would be "a distressing experience associated with actual or potential tissue damage with sensory, emotional, cognitive, and social components" (p. 2). This updated definition recognises the importance of cognitive and social components of pain, and this recognition will be vital throughout this thesis.

The updated definition of pain and its psychological and social components reflects a shift in our understanding of pain from a biomedical to a biopsychosocial approach (Engel, 1977). Whilst traditionally considered a sensory experience framed by the biomedical model, pain is now understood as also being influenced by psychological factors such as personality and behaviour, and social factors such as cultural norms. Whilst definitions and understandings of pain have changed over time, its meaning in this culture is relatively unchanged. In Western societies, pain is considered a diagnostic marker of harm and therefore a beneficial warning signal, prompting the individual to take action to avoid danger and further harm (Morris, 1991). However, some individuals experience pain after the initial damage or threat has ceased, at which point the pain fails to serve this function. This is often the case for 'chronic pain', which is the term used for pain which has persisted for more than three months (Merskey & Bogduk, 1994).

The development and maintenance of chronic pain can sometimes be explained by the Fear Avoidance Model of Pain (Lethem, Slade, Troup, & Bentley, 1983). The model proposes that fear of pain can lead to cognitive and behavioural avoidance, leading to depression and physical disability due to disuse of tissue. Since its invention, the model has been reconceptualised by Vlaeyen and Linton in 2000 to highlight the cyclical nature of fear

avoidance, with depression and disability feeding back into the pain experience, creating a continuous cycle. The model suggests that only when the individual is not afraid and able to confront their pain will recovery be achieved. The Fear Avoidance Model highlights how biopsychosocial factors can mitigate pain trajectories; particularly the way in which an individual copes with their pain.

Definitions and Models of Coping

Coping can be defined as a conscious effort to master, minimize, or tolerate a conflict or stressor (Lazarus & Folkman, 1984), and pain can be classified as a stressor when it exceeds an individual's perceived ability to manage it (Boothby, Thorn, Stroud, & Jensen, 1999). Coping has been explored in the pain literature as it is thought to have the ability to exacerbate or alleviate pain (Tunks & Bellissimo, 1988), and effective pain management can help individuals maintain their daily activities and detract attentional focus from pain (Achterberg et al., 2010; Johannes, Le, Zhou, Johnston, & Dworkin, 2010). Like most stressors, the short- and long-term effects of pain are determined in part by the way in which an individual copes with their pain (Skinner, Edge, Altman, & Sherwood, 2003).

Unfortunately, the study of coping with pain is often subject to the challenges of studying coping more generally. Ways of coping can be behavioural or cognitive, but beyond that there is little agreement amongst researchers of what constitutes coping (Tunks & Bellissimo, 1988). By Lazarus and Folkman's (1984) definition, coping includes *efforts* to manage a stressor, thus encompassing a range of strategies including those which are not effective or successful in achieving the desired outcome. As a result, ways of coping are often categorised, and then the categories are described as adaptive or maladaptive. For example, one popular categorisation is 'problem-focused' and 'emotion-focused' coping, with the former aiming to alter the problem (stressor) itself, and the latter aiming to alter one's emotional response to the stressor (Lazarus & Folkman, 1984). Problem-focused coping, sometimes equated with 'active' or 'instrumental' coping, is often considered more adaptive and effective than emotion-focused coping (Tamres, Janicki, & Helgeson, 2002).

However, classifying different coping strategies is not always straightforward. For example, seeking social support can be both problem- and emotion-focused, depending on whether the individual is seeking emotional support and comfort, or seeking advice focusing on solving the problem. Similarly, depending on one's perception, religious and spiritual

strategies such as prayer can be interpreted as both problem- and emotion-focused. Such confusions extend to pain-specific coping strategies, for example Jensen, Turner, Romano, and Karoly (1991) categorised ignoring the pain as active, and taking the painkiller as passive, which may seem counter-intuitive to some.

In their book chapter, Boothby et al. (1999) considered the most popular pain coping composites and their relationship to adjustment. They suggested that the three most popular categorisations were emotion- versus problem-focused coping, passive versus active coping, and illness- versus wellness-focused coping, and that problem-focused, active, and wellness-focused coping were generally assumed to be more adaptive than emotion-focused, passive, and illness-focused strategies. In doing so, Boothby et al. (1999) also highlighted the clear overlap between these different composites, and that such classifications are rarely consistent and despite such labels, often reveal little about functioning and adjustment. Indeed, Lazarus and Folkman (1984) suggest that whether a coping strategy is adaptive or not depends on the controllability of the stressor, and similarly Tunks and Bellissimo (1988) argue that coping strategies themselves cannot be considered inherently adaptive or maladaptive as this varies from situation to situation.

In an attempt to capture the complexity of coping, Skinner, Edge, Altman, and Sherwood (2003) conducted a literature review in the search for a complete structure of coping. They identified thirteen potential higher-order categories of coping, encapsulating 41 lower-order ways of coping. In doing so, they highlight that indeed, coping research has generated a comprehensive list of ways of coping, but that categorising strategies is challenging as ways of coping often serve many functions and are multidimensional. Based on these well-documented struggles and limitations, it seems necessary to refine the study of coping to my specific interest: pain relief.

The definition of pain relief. Previous research on coping with pain has focused largely on chronic pain, and ways of mastering or tolerating it due to the difficulties often faced when trying to minimise or relieve chronic pain. However, in this thesis I focus specifically on pain relief, sometimes referred to as pain control or pain management (Crombez, Eccleston, De Vlieger, Van Damme, & De Clercq, 2008), as the way in which an individual tries to relieve their pain can mitigate the impact the pain has on their life. As such, throughout this thesis I focus on the 'minimisation' element of Lazarus and Folkman's (1984) definition, applied specifically to pain; attempts to reduce or remove pain rather than master

or tolerate pain. Moreover, I was interested in both acute and chronic pains, so ways of relieving both acute and chronic pains are studied. As I explore connections between gender and pain relief more broadly, and my views align with Lazarus and Folkman (1984) and Tunks and Bellissimo (1988), I shall not focus on whether the ways of relieving pain explored in this thesis are adaptive or maladaptive, but rather will focus on psychosocial reasons for choosing such strategies, including factors related to sex, gender, and motivation.

Sex differences in pain experiences. How people experience and respond to pain is increasingly recognised as the result of a combination of unique, individualised factors (Fillingim, 2017). This includes demographic factors which, whilst not directly influencing pain, may reflect underlying mechanisms. Sex is an excellent example of this, as the classification of 'male' or 'female' represents a range of underlying biological factors implicated in the pain experience, such as sex hormones. Testosterone in particular is implicated due to its anti-nociceptive nature (Craft, 2007), whereas the effects of progesterone and oestradiol on pain sensitivity are more complex due to their pro-nociceptive and anti-nociceptive properties (Craft, 2007; Smith et al., 2006). It is also thought that there is an interaction between sex hormones and pain-related activation of opioidergic receptors in the brain (Smith et al., 2006). There is also evidence of an interaction between sex and genotype which influences pain sensitivity, with the A118G polymorphism of the mu-opioid receptor gene increasing pain sensitivity in women but decreasing pain sensitivity in men (Fillingim et al., 2005). A similar pattern has also been found in a clinical population in relation to recovery from lumbar disc herniation (Olsen et al., 2012).

The shift towards a more biopsychosocial approach has encouraged research into the pain-related psychological and social differences as well as biological differences between men and women. Research into psychological mechanisms has revealed fairly consistent patterns in catastrophizing and self-efficacy. Catastrophizing is a cognitive distortion characterised by rumination, magnification, and helplessness (Sullivan, Bishop, & Pivik, 1995). In relation to pain, this includes excessively thinking about pain, worrying that the pain will worsen or never cease, and a perceived lack of control over pain. Research consistently shows that catastrophizing is related to maladaptive pain outcomes (Bédard, Reid, McGrath, & Chambers, 1997; Heyneman, Fremouw, Gano, Kirkland, & Heiden, 1990; Sullivan & D'Eon, 1990), and is more common in women than men (Edwards et al., 2004; Jensen, Nygren, Gamberale, Goldie, & Westerholm, 1994; Keefe et al., 2000; Vierhaus et al., 2011). There is also evidence of sex differences in relation to self-efficacy and pain. Bandura

(1997) defines self-efficacy as the belief an individual holds about their ability to achieve their goals, which has been found to be related to lower levels of reported pain (Somers, Kurakula, Criscione-Schreiber, Keefe, & Clowse, 2012). Research has shown that men who report higher levels of self-efficacy subsequently demonstrate lower pain sensitivity to cold pressor pain (Jackson, Iezzi, Gunderson, Nagasaka, & Fritch, 2002).

When considering social factors which may be incorporated in an individual's pain experience, and particularly the different experiences reported by men and women, there is growing evidence of the importance of gender, which will be outlined in the next section.

Defining gender. Although often used interchangeably, the terms 'sex' and 'gender' are conceptually distinct. The term 'sex' is generally used to refer to biological differences that determine whether one is classified as male or female based on chromosomes, hormones, and internal and external sex organs (Unger, 1979). 'Gender' is a broader term, referring to the more psychological and sociocultural attributes typically associated with being male or female. This includes gender identity (one's self-representation as male or female) as well as how social institutions respond to an individual on the basis of their gendered self-presentation (Pardue & Wizemann, 2001). Another key gender concept is gender roles, which are the behaviours and values defined as masculine or feminine by society, dictating the appropriate and expected behaviours for men and women (O'Neil, 1990). Whilst sex is considered relatively more stable and fixed, gender can be understood as a verb; something actively done rather than a fixed attribute of the individual (Butler, 1993; West & Zimmerman, 1987). Some view gender as naturally occurring, for example that masculinity naturally accompanies being male. This is an illusion as a result of endemic socialization (Risman & Davis, 2013), and some have suggested that if men and women were socialised in the same way and given the same opportunities, there would be far fewer differences between men and women (Epstein, 1988). In fact, there is mounting evidence that sex differences are not as large as one might anticipate, and although gender stereotypes exist, few individuals consistently embody them (Hyde, Bigler, Joel, Tate, & van Anders, 2018).

For the purpose of this thesis, when referring to 'gender' I am referring to masculinity and femininity; the psychological and sociocultural attributes typically associated with being male or female. As such, I take a rather binary approach by focusing on masculinity and femininity in relation to cisgender men and women, in other words individuals whose gender identity and self-presentation match the categorical sex they were assigned at birth (Hyde et

al., 2018). This is not ideal, but a necessary first step in addressing the gap in the literature. Once we better understand how gender factors are related to cisgender male and female use of pain relief, we can then explore how transgender and gender-fluid individuals might differ in their approaches to pain management.

Applying Theories and Models of Gender to Health and Pain

As mentioned, this thesis will focus on masculinity and femininity based on traditional Western gender stereotypes. Gender stereotypes refer to the traits, characteristics, and behaviours expected of men and women based on their categorical sex (Stangor, 2000). In Western cultures masculinity is characterised by strength, stoicism, and agency, whereas femininity is characterised by being expressive and nurturing (Spence & Helmreich, 1979). It is considered normal and expected for men to have masculine traits and behave in masculine ways, and for women to have feminine traits and behave in feminine ways. When this is the case, this is known as gender norm conformity, which in turn upholds broader gender stereotypes (Cialdini & Trost, 1998). However, masculinity is not necessarily just for men, and femininity is not just for women.

Bem (1974) revolutionised our understanding of gender by suggesting that both men and women can have both masculine and feminine traits and behaviours, and indeed the 'psychological androgyny' that comes with doing so is more psychologically healthy than strictly adhering to one or the other. However, these potential health benefits can come at a cost. Men and women are socialised to behave in different ways from birth, and throughout their lives they learn the norms and customs expected of them based on their sex, and that there are negative consequences of violating these norms, such as punishment, embarrassment, and ridicule (Cialdini & Trost, 1998). The risk of facing these negative social consequences is a powerful motivator for gender norm conformity across all life domains, including health behaviours.

There is evidence that gender norms and stereotypes are related to a range of health behaviours. For example, endorsement of traditional masculine ideologies is related to underutilization of health care, unwillingness to seek help, and stoicism (Addis & Mahalik, 2003; Courtenay, 2000; Mahalik, Burns, & Syzdek, 2007), and therefore it is unsurprising that masculinity is related to a number of risky health behaviours (Blazina & Watkins Jr, 1996; Mahalik, Lagan, & Morrison, 2006; Pleck, Sonenstein, & Ku, 1994). This includes delaying help-seeking until the point at which one is obviously injured or seriously ill,

alongside trivialising serious symptoms to avoid threats to masculinity (O'brien, Hunt, & Hart, 2005).

Moreover, Mahalik et al. (2007) found that not only were male health behaviours predicted by their conformity to masculine norms in other life domains, but also by perceptions of the health behaviours of other men, demonstrating the pervasive influence of gender normativity on health behaviours. Not only do men's health behaviours often conform to masculine norms, they also actively avoid health behaviours perceived to be 'feminine', such as seeking social support and utilising healthcare services (LaCroix & Haynes, 1987). In fact, most health behaviours can be perceived as 'feminine' due to the way in which Western cultures encourage women to scrutinise their own and other female bodies (O'brien et al., 2005). This can discourage men from being interested in and taking care of their own bodies, lest they be perceived as 'feminine'. In turn, this can lead to poor health, which can pose a further threat to masculinity, making it a cyclical issue (Courtenay, 2003; Garfield, Isacco, & Rogers, 2008).

Male avoidance of behaviours with 'feminine' connotations is common and can be explained through Precarious Manhood Theory and the Antifemininity Mandate (Vandello & Bosson, 2013). According to Precarious Manhood Theory, masculine status is a temporary reward for demonstrations of masculinity, meaning that men often behave in stereotypically masculine ways to continuously prove their manliness to others. The Antifemininity Mandate suggests that avoiding acting in a feminine way is a key part of this, as masculinity is so precarious, and within the definition of masculinity is an aversion to femininity (Blazina, 1997). This is because even one single unmasculine behaviour can erode one's masculine status regardless of how many masculine acts one has previously performed. A related concept is the 'mask of masculinity' which refers to the way in which men must hide any indication of weakness, vulnerability, or powerlessness (Pollack, 1998).

These patterns of masculine and feminine behaviours may be particularly relevant to the study of pain. It has been suggested that statistics may underestimate male pain due to the ways in which pain violates masculine gender norms in men (Macintyre, 1993). There is a strong theoretical rationale for how and why gender stereotypes might influence pain expression and responses to pain such as using pain relief. Masculinity in Western societies prescribes stoicism, self-reliance, and independence, and may therefore pose barriers to men in relation to expressing pain, seeking help, and seeking pain relief (Keogh, 2015). As a result

of masculine norms and stereotypes, there is pressure on men to remain stoic and inexpressive when in pain in order to appear strong and 'manly', and to avoid being judged as weak by others, which could also evoke feelings of shame and fear (Galdas, Cheater, & Marshall, 2007; Paulson, Danielson, & Söderberg, 2002; White & Johnson, 2000).

Femininity, on the other hand, advocates pain expression and sensitivity, and through socialization this encourages women to express their pain and perform pain behaviours (Violon, 1985). Koutantji, Pearce, and Oakley (1998) proposed that sex differences in pain reports are partly the result of different social models. From a young age, girls are exposed to female social models who facilitate the development of an acceptance of pain and pain-related behaviours, which encourages females to be more cognizant of their own pain and the pain of others. Males are unlikely to have male social models encouraging such beliefs and behaviours. Different social models can therefore perpetuate sex-specific expectations of how men and women should experience and respond to pain.

As is becoming clear, there are many levels at which gender intersects with pain, which Bernardes, Keogh, and Lima (2008) modelled onto the framework of explanation proposed by Doise (1986). They proposed that gender can be related to pain at four general levels: the intra-individual, situational, positional, and ideological levels. At an intra-individual level, gender is an intrinsic characteristic of an individual which may influence their pain experience, for example their endorsement of gendered traits. Gender at a situational level refers to context-dependent gendered pain behaviours. At a positional level, one's sex/gender can represent a social status by which their pain experiences and behaviours can be interpreted in relation to that of others. Finally, at an ideological level there are gendered beliefs, norms, and values in relation to pain which maintain social order.

Bernardes et al. (2008) noted that most pain and gender research is situated within the intra-individual and ideological levels of explanation. For example, at the intra-individual level there have been investigations of the sex-specific expectations people hold in relation to pain. Robinson et al. (2001) found that both men and women reported the typical woman to be more willing to report pain, more sensitive to pain, and less able to endure pain than the typical man. There is also evidence that both sexes expected women to report more pain than men for common pain experiences, and again this was thought to be the result of shared and consistent gender-role related social learning (Robinson, Gagnon, Dannecker, et al., 2003; Wandner, Scipio, Hirsh, Torres, & Robinson, 2012). There is even evidence that both nurses

and laypeople associate different types of pain with either men or women (Bernardes, Silva, Carvalho, Costa, & Pereira, 2014), suggesting that all aspects of the pain experience can be perceived as gendered.

Associations between gender and pain are bolstered by evidence that masculinity and femininity are indeed related to laboratory-induced pain threshold and tolerance in line with gender stereotypes. Alabas, Tashani, Tabasam, and Johnson (2012) conducted a systematic review and meta-analysis of studies testing the relationship between gender roles and experimental pain responses, and found that overall masculine traits were positively correlated with pain threshold and tolerance, whilst feminine traits were negatively correlated with threshold and tolerance, although these effect sizes were small. They also reviewed studies measuring pain-related gender stereotypes using Robinson et al.'s (2001) Gender Role Expectations of Pain measure, and found that people who felt they were less sensitive to pain than the typical woman showed higher threshold and tolerance, with a moderate effect size. Similarly, they found that pain intensity and unpleasantness scores were higher in individuals who rated themselves as more willing to report pain than the typical man. Again, the effect size was moderate.

Despite these findings, there is also evidence that women can face serious challenges when experiencing pain, many of which are also driven by gender stereotypes. Whilst feminine stereotypes may not prohibit pain expression and seeking help, being more willing to express discomfort than men has led to the perception that women are more emotional, which can actually disadvantage them in healthcare settings (Criste, 2002). The stereotype that women are overly emotional, hysterical, and prolific complainers means that their symptoms are often underestimated, and the psychological distress which often accompanies pain is ignored (Côté & Coutu, 2010).

As such, some women face a paradox in wanting to suffer in silence to avoid reinforcing this stereotype (Werner, Isaksen, & Malterud, 2004), but of course the result of this is that they still do not receive appropriate treatment and support. In terms of healthcare settings, given the distrust they sometimes face, it is hardly surprising that women tend to perform more pain behaviours than men (Osborn & Smith, 1998). Indeed, it seems that validating women's pain results in fewer external pain behaviours (Gustafsson, Ekholm, & Ohman, 2004).

In addition to the distrust many women in pain face, there is also evidence that they are judged based on their appearance in clinical settings. Again, women must find a balance between looking sick enough to be taken seriously, but not too sick that they are labelled as distressed (Werner & Malterud, 2003). Experiencing chronic pain is also thought to have specific implications for the alterations to self-identity and domestic strain faced by women. For example, because modern women often have a 'double workload' of paid employment in addition to housework and childcare, the strain they face is likely different to that of men, and women may be more likely to delay returning to work following pain-related absence due to their many social roles (Ockander & Timpka, 2003). Indeed, men in pain tend to stop functioning until they have recovered, whereas traditionally women must continue their roles as wives, mothers, and homemakers (McCaffery & Ferrell, 1992). As a result, the ways in which pain can interfere with a woman's daily life and responsibilities can be more complex and multifaceted than that of a man (Marshall, 1997).

A recent review by Samulowitz, Gremyr, Eriksson, and Hensing (2018) compiled the evidence of gender norms in relation to chronic pain and their results suggest that indeed there are gender norms which pose issues to both men and women. Taken together, there is substantial evidence that women in pain can sometimes be perceived as hysterical, overly-emotional malingerers who fabricate their pain and do not wish to get better. For men, however, there is the perception and expectation that they will demonstrate stoicism by ignoring and denying pain, and taking health risks to maintain a feeling of autonomy and control over their pain. Samulowitz et al. (2018) also compiled a large body of evidence suggesting that women's pain is more often attributed to psychological causes than men, and again found plenty of evidence that women struggle for legitimacy as patients, and that their level of pain is judged by their appearance. The different judgements and issues faced by women is reflected in their treatment, with substantial evidence of treatment biases resulting in men's pain being more appropriately managed than women's (Samulowitz et al., 2018).

These findings suggest that broader gender stereotypes influence lived pain experiences as well as expectations about how men and women should experience and express their pain. The logical next step is to consider the coping strategies men and women use to cope with pain, and how this might be influenced by gender stereotypes, which will be reviewed in the following section.

Sex and Gender Differences in Coping with Pain: A Review of the Literature

The idea that men and women cope with pain in different ways emerged from broader research exploring how men and women cope with stressors more generally. It is generally thought that sex differences in coping are the result of both dispositional differences between men and women leading them to choose different ways of coping, as well as their different social roles leading them to experience different stressors and hold different goals and priorities (Rosario, Shinn, Mørch, & Huckabee, 1988; Tamres et al., 2002). Lazarus and Folkman (1984) suggested that choice of coping is dependent on primary and secondary threat appraisals, which may also help to explain sex differences in coping behaviours. Appraising the threat itself is considered a primary appraisal, whilst a secondary appraisal relates to the self-perceived resources available to address the threat. As men and women often have different coping resources available to them (Tamres et al., 2002) and different perceptions of their ability to manage threats (Somers et al., 2012), it is unsurprising that they might cope with stressors and threats in different ways.

Early research suggested that male coping tended to be characterised by active, problem-focused strategies, whilst female coping tended to be more emotion-focused (Billings & Moos, 1981; Folkman & Lazarus, 1980; Rollman, Lautenbacher, & Jones, 2000; Stone & Neale, 1984; Vingerhoets & Van Heck, 1990). Tamres et al. (2002) conducted a meta-analysis which reflected this, finding that women used emotion-focused strategies more than men did, but also that of the strategies studied, most were used more by women than men. The idea that women utilise a broader range of coping strategies than men do is also supported by Astor-Dubin and Hammen (1984), who found that men relied mostly on cognitive strategies, whilst women used both cognitive and behavioural strategies. The researchers interpreted this as suggesting that men cope more internally than women do. Whilst this conflicts with the idea that men use more problem-focused strategies, there is evidence of a male pattern of coping involving either confronting the problem directly (e.g. problem-focused coping) or denying its existence (cognitive, internally focused coping) (Pearlin & Schooler, 1978; Stone & Neale, 1984; Veroff, Kulka, & Douvan, 1981). This paradoxical evidence makes it difficult to draw a clear conclusion about male coping patterns.

Moreover, despite Astor-Dubin and Hammen (1984)'s evidence that men use fewer behavioural coping strategies, there are some behavioural strategies which are considered

more typically 'male', such as tension-reducing strategies such as smoking, drinking alcohol, and drug abuse. Verbrugge (1985) claimed that men engaged in these behaviours to cope with psychosomatic symptoms, whilst women sought social support and used medical drugs. Seeking social support is an example of an emotion-focused strategy found to be popular amongst women (Tamres et al., 2002). However, researchers recognise that the reason women may rely more on social support as a form of coping is because they have much wider support networks which they are better able to rely on in comparison to men (Almquist, Östberg, Rostila, Edling, & Rydgren, 2013; Cornwell, 2011).

The idea that some coping strategies are more stereotypically associated with either men or women has led some to consider the role of gender in relation to coping. Such research generally supports the aforementioned literature, for example masculinity is related to problem-focused coping (Nezu & Nezu, 1987), and femininity is related to emotion-focused coping (Blanchard-Fields, Sulsky, & Robinson-Whelen, 1991). However, of interest is that these results are found in both men and women, as both sexes can have both masculine and feminine traits. This is further demonstrated in Renk and Creasey's (2003) study of sex and gender differences in how adolescents cope with stress, in which they found that gender was a more valuable predictor of coping than sex. Taken together, these studies suggest that both sex and gender are important factors to consider in relation to coping.

To explore the roles of sex and gender in relation to coping specifically with pain, the following sections will review the extant literature exploring sex and gender differences in coping with pain. Omitted from these sections is literature exploring the role of catastrophizing. Despite prolific research attention, there is debate as to whether catastrophizing is a coping strategy as it occurs automatically. As this thesis adheres to the definition of coping as conscious efforts, automatic cognitions are not included in this review.

Sex Differences in Coping with Chronic Pain

Sex differences in ways of coping with chronic pain have arguably received the most research attention. Estlander (1989) was one of the first, and found no main effect of sex on any of the coping subscales of the Pain Coping Strategies Questionnaire (CSQ; Rosenstiel & Keefe, 1983). Also using the CSQ, Jensen et al. (1994) studied sex differences in coping with chronic musculoskeletal pain. When controlling for confounding factors, they found no significant sex differences, suggesting men and women may not significantly differ in how they cope with chronic musculoskeletal pain. In a similar study, Grossi, Soares, and

Lundberg (2000) studied sex differences in coping in Swedish patients with musculoskeletal disorders using the CSQ, and again found no significant sex differences when controlling for confounding variables.

Considering a range of chronic pains, Edwards, Augustson, and Fillingim (2000) also found no sex differences in pain coping strategies as measured by the CSQ. This pattern of for null results extends to Koopman et al. (2004), who studied pain coping strategies for chronic lower-back pain using the Dutch version of the CSQ (Spinhoven, Ter Kuile, & Linssen, 1994). Analytic focus was on the change in coping strategies over three time points rather than sex differences, but no significant sex interaction effects were found between coping and time point. Taken together, these studies suggest that men and women do not significantly differ in the ways they cope with chronic pain as measured by the CSQ.

It is possible that these null results are due to use of the CSQ, as other measures have yielded results more aligned with the broader coping literature. For example, Keogh and Eccleston (2006) used the Pain Coping Questionnaire (PCQ; Reid, Gilbert, & McGrath, 1998) and found that adolescent females with chronic pain were more likely than adolescent males to use social support networks and positive self-statements, whilst males were more likely to use behavioural distraction. Some of these findings support those of Unruh, Ritchie, and Merskey (1999), who also used the PCQ, and found that women used a greater number of strategies than men, including problem solving, palliative behaviours, positive self-statements, and social support. It is worth noting that in this study participants reported on troublesome pains within the last 2 weeks, so this result may be based on both chronic and acute pains, although the authors reported that 80% of the pains reported were recurrent or chronic. Rovner et al. (2017) also provide evidence that women report significantly more social support than men, as well as a higher activity level.

The evidence that women use emotion-focused strategies such as social support to cope with pain more than men do reflects the broader coping literature. Other pain coping studies have found evidence aligned with the broader coping literature, for example Wijnhoven, de Vet, and Picavet (2007) found that women with any form of musculoskeletal pain were more likely than men to use medication, as well as being more likely to have more contact with a medical caregiver. Although Grossi et al. (2000) found no sex differences in CSQ strategies, they did find that women had undergone more somatic treatments (e.g. acupuncture and transentaneous nerve stimulation) than men, and that women reported higher

consumption of analgesics than men. This suggests that men and women may differ in terms of the medication they seek and their use of healthcare services, which again reflects the broader coping literature.

Taking a different methodological approach, Affleck et al. (1999) studied the effects of osteoarthritis and rheumatoid arthritis on daily pain, mood, and coping using 30-day diaries and the Daily Coping Inventory (Stone & Neale, 1984). Affleck et al. (1999) found that women used relaxation and distraction, and sought spiritual comfort and emotional support more than men, providing further evidence that women use more emotion-focused strategies than men. Fisher, Ballantyne, and Hawker (2012) also studied osteoarthritis, but focused on medicine use as a specific form of coping. They found that women were significantly more likely than men to take acetaminophen (generally considered a 'safe' medication for treatment of osteoarthritis) up until the age of 80, after which differences disappeared. There were no significant differences in use of 'less safe' medications such as opioids. Fisher et al. (2012) interpreted this from a gendered perspective, suggesting that the process of ageing is applied differentially to men and women, with women being perceived as 'older' and more frail at a younger age than men, resulting in their physicians relying on 'safer' medications. This study is a good example of how factors other than symptom severity may influence sex differences in coping with pain, such as medication use.

Fisher et al. (2012) are not the only researchers to interpret their findings through a gendered lens. Racine et al. (2015) studied sex differences in coping with fibromyalgia using the Chronic Pain Coping Inventory (Jensen, Turner, Romano, & Strom, 1995) and found that men were more likely than women to avoid activity to cope with their pain. As fibromyalgia is more prevalent in women than men, demonstrated by the fact that only 6% (N = 48) of their sample were men, they highlighted the need for future research to consider gender and how different stereotypes and expectations related to different types of pain might influence pain experiences, beliefs, and coping behaviours.

Another predominantly female condition, rheumatoid arthritis (RA), has also received research attention, with Flurey et al. (2014) taking a Q-methodological approach to explore how men and women cope with RA. Their results suggest that men and women do seem to cope with their RA in different ways, with women tending to use effective self-management strategies to control the impact RA has on their daily lives, whilst men struggled to do this. Many women also seemed to prioritise their other life responsibilities above their RA,

suggesting that men and women cope with the condition in different ways, and that this affects the impact it has on their lives.

Taken together, these studies provide mixed results. Whilst there is consistent evidence that women take medication, including analgesics, more than men (Fisher et al., 2012; Grossi et al., 2000; Wijnhoven et al., 2007), use social support more than men (Keogh & Eccleston, 2006; Rovner et al., 2017), and use positive self-statements more than men (Keogh & Eccleston, 2006; Unruh et al., 1999), there is confusion as to whether men or women use more distraction techniques (Affleck et al., 1999; Keogh & Eccleston, 2006). However, there does seem to be evidence that men use more avoidant behaviours (Racine et al., 2015), including reducing their activity levels (Rovner et al., 2017), whilst women report higher levels of activity (Rovner et al., 2017). However, several studies failed to find significant sex differences in pain coping strategies when controlling for confounding variables (Edwards et al., 2000; Estlander, 1989; Grossi et al., 2000; Jensen et al., 1994; Koopman et al., 2004; Racine et al., 2015). Overall, it is difficult to draw any firm conclusions due to the variety of chronic pains included, the range of methods utilized, and the different analytic focuses. To see whether these issues also apply to acute pains, the next section will review the literature exploring sex differences in coping with acute pain.

Sex Differences in Coping with Acute Pain

Research on sex differences in coping with acute pain often takes an experimental approach. For example, Bento et al. (2010) studied how men and women coped with cold pressor pain using a situation-specific version of the CSQ. They found that men used active coping strategies (formed of diverting attention, coping self-statements, ignoring the pain, reinterpreting pain sensations) and perceived more control over their pain than women. Extending the study of coping with cold pressor pain to children and adolescents, Vierhaus et al. (2011) focused specifically on cognitive coping. They used the Pain-Related Cognitions Questionnaire for Children (Hermann, Hohmeister, Zohsel, Ebinger, & Flor, 2007) and found that problem solving and positive self-statements did not mediate the relationship between sex and pain intensity. The authors also measured masculinity and femininity, but did not report whether or not these traits were related to pain coping. Kröner-Herwig et al. (2012) also found no evidence of sex differences in problem-focused coping such as positive self-statements, this time measuring coping responses to laboratory-induced pressure pain. However, they did find that women used more approach (e.g. information seeking) and

emotion focused (e.g. worrying) coping than men, supporting some of the aforementioned literature.

Moving beyond coping with experimentally induced pain, research has also considered coping with naturally occurring pains. Edwards et al. (2004) collected self-report data of everyday pain experiences to investigate how healthy adults cope with naturally occurring pains. They found that women reported greater use of praying/hoping than men, but found no other sex differences in coping strategies (excluding catastrophizing), as assessed by the CSQ. Similarly, Keogh and Denford (2009) studied how healthy men and women generally cope with pain using the CSQ and found no sex differences in any of the coping strategies.

Other studies have focused specifically on individual coping strategies, such as consuming alcohol or analgesics. Riley and King (2009) explored the use of alcohol to cope with a range of pains in a multi-ethnic community sample. For each of the types of pain studied, men were significantly more likely than women to use alcohol to cope with it. However, the inclusion criterion in terms of pain was that participants reported pain symptoms twice or more over 6 months, which could be considered chronic rather than acute pain, depending on the definition applied. It is likely that both chronic and acute pains were included in the study, and therefore it may be that men are more likely to use alcohol to cope with both chronic and acute pains than women are. Also studying alcohol consumption as a pain coping strategy, Brennan, Schutte, SooHoo, and Moos (2011) found that a higher number of pains was related to more frequent drinking problems in men but not women. Taken together, these results suggest that coping with pain by drinking alcohol is more common amongst men than women.

Moving from alcohol consumption to use of analgesics, Vowles et al. (2014) studied use of analgesics to manage everyday pains across Europe and Russia. They found that women reported significantly greater use of analgesics than men. This sex difference in use of analgesics has also been found in Sweden (Isacson & Bingefors, 2002) and Spain (Bassols, Bosch, Campillo, Cañellas, & Baños, 1999). These findings suggest that women use analgesic medication more than men for acute as well as chronic pain, and also support the broader finding that women are more likely to take a range of medications than men (Simoni-Wastila, 1998, 2000).

Compared to chronic pain studies, fewer studies of sex differences in coping with acute pain have yielded non-significant findings. There is evidence supporting the broader coping literature and the chronic pain literature that women use more emotion-focused strategies (Kröner-Herwig et al., 2012), spiritual strategies (Edwards et al., 2004), and medication such as analgesia (Bassols et al., 1999; Isacson & Bingefors, 2002; Vowles et al., 2014) to cope with their pain, as well as evidence to suggest men use alcohol to cope with pain more than women do (Brennan et al., 2011; Riley & King, 2009). However, there seems to be contradiction concerning whether men or women use positive self-statements more (Bento et al., 2010; Kröner-Herwig et al., 2012), or indeed if there is any sex difference at all (Vierhaus et al., 2011)

Some researchers have suggested that gender be considered to better understand sex differences (Fisher et al., 2012; Racine et al., 2015), as observed sex differences may in fact be the result of gender-related factors. The next two sections shall review the research which has explored gender in relation to coping with chronic and acute pains.

Gender Differences in Coping with Chronic Pain

A recent review by Samulowitz et al. (2018) compiled the gender norms which exist in relation to how men and women cope with chronic pain. In this review, 'coping' seems to refer to the way in which men and women managed the impact their chronic pain had on their lives generally, rather than the use of coping strategies discussed so far. For men, the reviewed literature tended to focus on the threat their pain posed to their masculine gender identity, and how they managed this by attempting to continue their life as normal to not allow this threat to take hold. This included continuing in paid work to uphold their identity as 'breadwinner', continuing their hobbies (particularly sport), and generally distancing themselves from the pain by ignoring it, not talking about it, and not complying with physician advice. Many of these behaviours involved hiding their pain in public and actually increased their pain.

Such themes and ideas are apparent in studies focusing on how masculinity influences how men cope with pain. Focusing specifically on help-seeking, Galdas et al. (2007) explored how masculinity impacts the interpretation of chest pain and help seeking decisions in White, Indian, & Pakistani men. Amongst these men, initial responses to pain were similar, as most waited to see if the pain became worse before seeking medical help. However, differences arose as pain persisted. White men were particularly concerned with displaying

masculinity through a high pain tolerance, and thus delayed seeking help until the pain had become incapacitating, and sought help as a last resort. Conversely, Indian and Pakistani men did not perceive seeking help for their pain as 'unmanly' or a sign of weakness. These results suggest that culture-specific conceptions of masculinity play an important role in the decision to seek help for pain.

Flurey and colleagues have also explored the role of masculinity in how men cope with pain, focusing specifically on RA. Flurey et al. (2016) found that men with RA take one of two approaches to managing their RA; taking a proactive approach to manage the impact of their condition on their life, or attempt to hold on to their pre-RA 'macho' persona, continuing their life as before even though it may cause them pain. These results show the struggle some men face in terms of renegotiating their masculine identity following a chronic pain diagnosis. This idea is explored further by Flurey, White, et al. (2017), who present case studies of the various ways in which men attempt to renegotiate their masculine identity to cope with their RA diagnosis. The tension between chronic pain and masculinity is also referenced by Ahlsen, Mengshoel, and Solbrække (2012), who note that men's stories of chronic muscle pain centre on rationality and self-control, with rich descriptions of objective facts rather than their own feelings and experiences of pain and distress. Moreover, Ahlsen, Bondevik, Mengshoel, and Solbrække (2014) found that men sought a medical solution to their chronic pain whereas women redefined their self-perceptions to become more accepting of their new identity as a person with chronic pain.

The challenges RA can pose to masculinity are also explored by Flurey, Hewlett, et al. (2017), who also found evidence for different coping preferences in men with RA. For example, some men behaved in risky and destructive ways to continue their lives as normally as possible, whilst others withdrew socially to deal with the emotional struggles of their condition privately, or as a result of being unable to join in with the activities. Many used coping behaviours to help them to adapt to their RA, for example using tools to allow them to complete tasks affected by their RA, and seeking information about their condition as a way of staying in control. This also reflects the preference of the men to have informational sessions as a way of receiving support, rather than discussion groups, but again the men differed in the more practical details of how such sessions should be delivered.

These results suggest there is not a 'one size fits all' way for men to cope with and renegotiate the impact of pain on their masculine identities. Even within men with the same

condition there are notable differences in coping styles which appear to influence the impact the condition has on their lives. Such variation seems to be due to a range of factors including cultural differences in conceptions of masculinity, but also interpersonal differences in personality and identity. Interestingly, the way that the women in Ahlsen et al.'s (2014) study described redefining their identities to adapt to and incorporate their diagnosis is comparable to one of the approaches taken by some of the men in Flurey et al.'s (2016) study. This may reflect interpersonal differences in personality and identity as it may be that men with more traditionally masculine identities before their chronic pain diagnosis struggle more to adapt to their diagnosis than men with less traditionally masculine identities, who may be able to adapt in the same way as women who (presumably) are not constrained by masculine norms and stereotypes. This really highlights the value of taking a gendered approach to studying coping with pain, as gender identity may impact how one copes with a chronic pain diagnosis more than categorical sex. However, our understanding of this idea is somewhat limited to masculinity in males, as there is little research on how femininity is related to coping with chronic pain.

Samulowitz et al. (2018) also reviewed the sparse literature pertaining to female experiences of chronic pain. As for men, this focused less on how women used specific pain coping strategies and more on their experiences of managing the impact of the pain on their lives generally. For example, they found that women with chronic pain often struggled to manage their pain whilst maintaining the other social roles they are expected to hold by society: being a mother and a spouse, being in paid employment, being responsible for maintaining the household, and also managing social relations with friends and family. The multiple and complex identities women are expected to hold was proposed as an explanation for why women use more coping strategies than men; the demands they face are more complex and multifaceted. Although not discussed explicitly as such, this review captures how femininity and expectations of female behaviours are related to chronic pain. Next, I shall review the research conducted exploring masculinity and femininity in relation to coping with acute pain.

Gender Differences in Coping with Acute Pain

Very few studies have explored how gender is related to coping with acute pains. Kröner-Herwig et al. (2012) measured gendered traits using a German version of the Bem Sex Role Inventory (Bem, 1974; Schneider-Düker & Kohler, 1988), which they found were

not related to any type of pain coping, as measured by the PCQ (Reid et al., 1998). Taking a more hypothetical approach, Keogh and Denford (2009) asked men and women to complete the CSQ from the perspective of the typical man or typical woman, and found that people held sex-specific expectations for how men and women cope with pain, complementing the research outlined earlier in relation to expectations of how men and women experience and express pain. Specifically, they found that their participants believed the typical man was more likely to ignore the pain and use coping self-statements, whilst the typical woman was believed to pray and try to distract themselves from the pain more than the typical man.

Keogh and Denford (2009)'s findings are gendered as they refer to expectations and attributes associated with being male or female, suggesting that ignoring the pain and coping self-statements may be related to typical notions of masculinity, whilst praying and distraction may be related to femininity. Indeed, the finding that men are expected to ignore the pain is in line with gender theories (Addis & Mahalik, 2003) as well as research finding that men ignore the pain, amongst other strategies, more than women (Bento et al., 2010). The belief that women pray more than men to cope with pain also supports previous research finding such sex differences (Affleck et al., 1999; Edwards et al., 2004). However, it is surprising that there were gendered expectations that women use distraction and men use coping self-statements, given the contradictory research evidence outlined earlier. Moreover, given that Kröner-Herwig et al. (2012) found no gender differences in coping strategies, there are many questions which remain unanswered about the role of gender in how men and women cope with both chronic and acute pains.

Summary of Literature Review

To summarise, it seems that there is somewhat greater pain prevalence, intensity, disability, and frequency reported by women compared to men, and that men tend to have a higher pain threshold and tolerance of laboratory-induced pain than women. These findings are also in line with evidence that both men and women believe that women are more willing to report pain, more sensitive to pain, and less able to endure pain in comparison to men. Indeed, these beliefs predict a range of laboratory-induced pain outcomes, as do masculine and feminine traits. In terms of coping, there is clear evidence of sex differences in some coping strategies, with women using more somatic treatments, medication (including analgesics), medical care, worrying, social support, relaxation, and spiritual comfort and

prayer. Meanwhile, men seem to use avoidant, risky, and destructive behaviours, drink more alcohol, ignore the pain, reinterpret pain sensations, and sometimes withdraw socially. It is unclear whether there are sex differences in information seeking, distraction, problem-solving, and use of positive self-statements due to inconsistent findings. Of the studies reviewed, few directly explored the role of masculinity and femininity in relation to sex differences in coping with pain, so any inferences at this time are largely speculative.

Emerging Research Problems

This literature review has highlighted some research problems which will need to be addressed in this thesis.

Difficulties of studying coping. There is little consensus amongst researchers as to what constitutes 'coping' (Tunks & Bellissimo, 1988), including debate as to whether coping includes conscious, deliberate effort, therefore excluding automatic thoughts and actions. This includes catastrophizing, which has been excluded from this review, despite the fact that many researchers consider it a coping strategy. This literature review has revealed inconsistent findings in terms of sex and gender differences in coping with pain, which may reflect differences in defining and measuring coping.

Tamres et al. (2002) suggest that the broad way in which coping is often defined and conceptualised poses challenges to examining specific sex differences, and that definitions of coping ought to be more carefully delineated. The most commonly used coping instrument in this review was the CSQ (Rosenstiel & Keefe, 1983), which consists of six cognitive scales, but only one behavioural scale. This single scale relates only to increased behavioural activity, which tends to refer to distracting behaviours, and revisions to the CSQ have even suggested that the behavioural items be removed (Robinson et al., 1997). The CSQ and similar measures of pain coping tend to have been designed for use with chronic pain patients who use coping to try to endure their pain due to its intractable nature. As such, these measures are not necessarily appropriate for studying acute pains, and certainly not for studying ways of specifically relieving pain.

How I will overcome these problems in my thesis: I will focus specifically on ways of relieving pain, defined as any attempt to reduce or remove the pain, including behavioural as well as cognitive strategies. This will involve developing a new measure which captures the rich variety of different ways of trying to relieve pain, including analgesic consumption and healthcare utilisation, as these seem particularly relevant to both gender and pain relief.

Difficulties of studying sex and gender. The terms "sex" and "gender" are commonly used interchangeably in the literature, reflecting the confusion surrounding the concepts and a lack of understanding of the value that gender can offer to the study of pain. Whilst sex is commonly studied, gender-related factors such as gender roles and stereotypes are sometimes referred to when sex differences are found, but rarely studied directly. Focusing only on sex not only neglects some of the commonalities between men and women, but also the variance within women and within men.

How I will overcome these problems in my thesis: I will study gender-related factors as well as categorical sex in relation to pain relief to help us better understand within-sex variability in the use of pain relief. As gender manifests itself in our lives in multiple ways, and it is not clear which ways might be most relevant to pain experiences, I shall explore multiple concepts of gender, including gendered traits, gender norm conformity, and gender norms and stereotypes. It is also important to recognise that not all men conform to masculine norms, nor do all women conform to feminine norms, and so I shall also consider the role of motivation. In relation to sex, gender, and pain relief, motivation may take many forms. A good starting point seems to be to consider motivation to relieve pain, and how this might be related to sex, gendered traits and gender norm conformity. Doing so should provide a deeper and more nuanced understanding of how sex and gender might be related to use of pain relief.

Next Steps

It is undeniably an exciting time in gender and pain research. There is a strong foundation of research which has studied sex differences in experiences of pain, as well as the gendered beliefs people hold about how men and women experience and express pain. Considering coping with pain, there is evidence of some sex differences in ways of coping with pain, particularly acute pains, but recognition that gender may influence the ways in which men and women cope with both acute and chronic pain. Theoretical understandings of gender have been applied to investigations of beliefs about appropriate pain behaviours and have been referred to post-hoc to explain sex differences in coping with pain. It is time to take the next step forward by applying theoretical knowledge of gender to the ways in which men and women specifically try to relieve pain, and their motivation for doing so. This will help to provide a more holistic understanding of how men and women use pain relief, and the factors which contribute to their choices. In turn this knowledge will allow healthcare

practitioners to better understand the patient perspective and facilitate a collaborative patient-practitioner effort to achieve more optimal pain relief.

Reviewing the extant literature has raised important questions which must be answered to progress this field forward, which I shall address in this thesis. In this thesis I aim to advance our understanding of how sex and gender are related to ways of relieving both acute and chronic pains. I was particularly interested in the challenges that gender roles, norms, and stereotypes might pose to men and women seeking pain relief. This includes asking how masculinity is related to pain relief, but also the relationship between femininity and pain relief, which is often neglected in the literature in comparison to masculinity. I also wanted to explore how motivation was related to pain relief, particularly in relation to gender norm conformity. The model in Figure 1.1 shows how each study will address each of these research questions. A theoretical model visualising the proposed relationships to be explored is shown in Figure 1.2.

As the studies presented in Chapters 3-6 are formatted for publication, they are introduced with a brief background section to form a more coherent narrative of the importance and rationale for each study in relation to the broader thesis. The complete thesis is discussed broadly in Chapter Seven. Each chapter is briefly outlined below.

Chapter Two: This chapter describes the development of two new pain relief measures; motivation to relieve pain and use of pain relief strategies. Principal component analyses are reported for both measures.

Chapter Three: This chapter focuses on my first empirical study (Study 1), in which a cross-sectional questionnaire was used to test how masculine and feminine traits and masculine and feminine gender norm conformity are related to use of pain relief, and the mediational role of motivation to relieve pain.

Chapter Four: This chapter documents two Q-methodological studies (Studies 2 and 3) exploring norms and stereotypes in relation to men and women's use of pain relief.

Chapter Five: In this chapter, the results of semi-structured interviews exploring the factors underlying perceptions of male and female pain relief norms using thematic analysis are presented (Study 4).

Chapter Six: This chapter reports two laboratory investigations (Studies 5 and 6) studying the effect of manipulating pain relief gender norms on subsequent pain relief behaviours using cold pressor pain induction.

Chapter Seven: This chapter triangulates the findings collated throughout the thesis and makes recommendations for practical applications and future research.

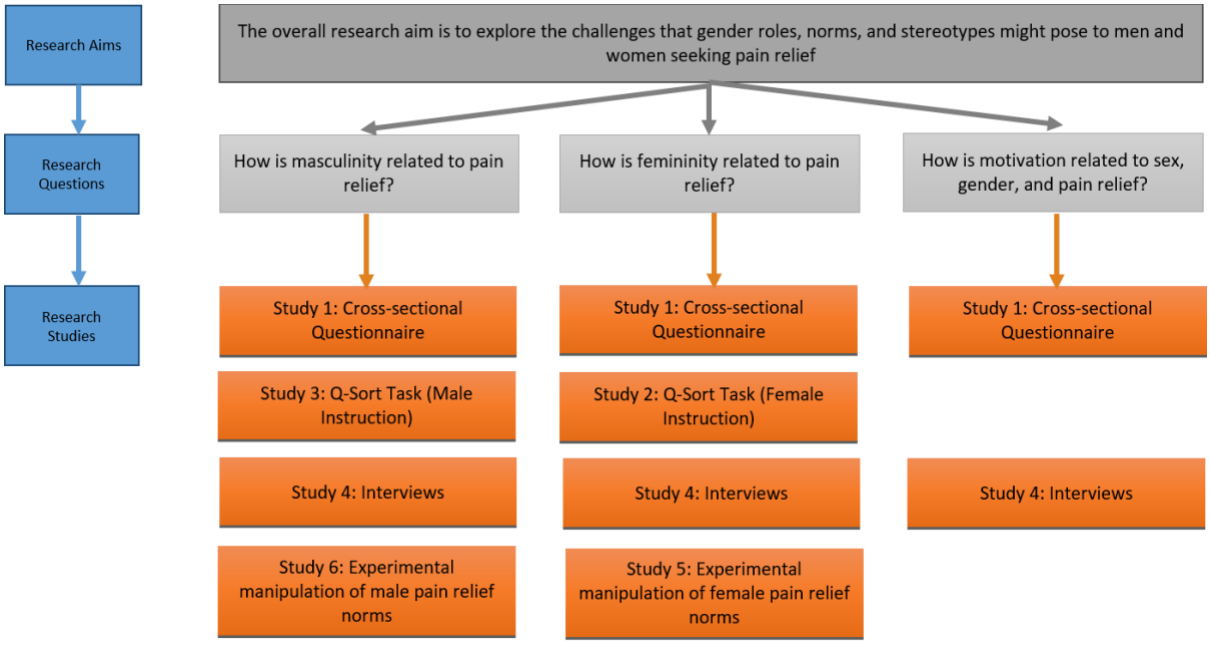

Figure 1.1. An outline of how each research study will address each research question.

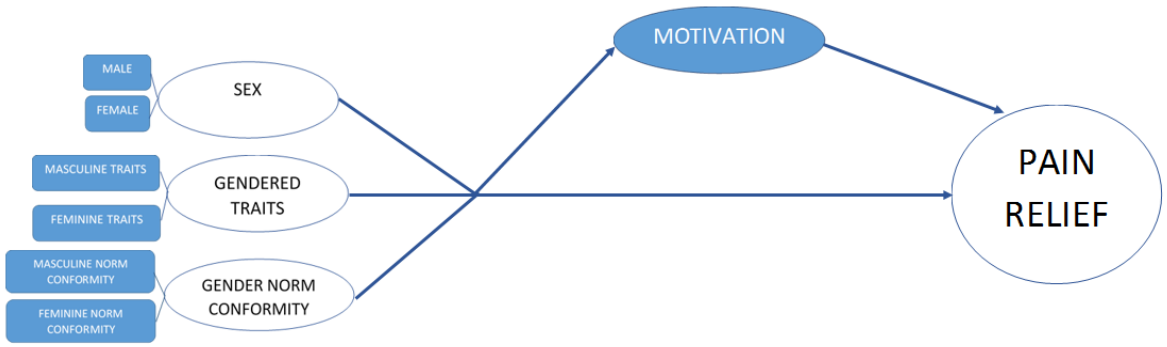

Figure 1.2. Theoretical model of relationships between sex, gender, motivation, and pain relief guiding this thesis

Chapter Two: Development and psychometric testing of new measures

Introduction

The previous chapter reviewed the literature which indeed suggests that men and women cope with pain in different ways, and that gender may influence these differences. The literature review highlighted a number of unanswered questions which I aim to answer in this thesis, including how sex and gender are related to pain relief as a specific form of coping, and motivation to relieve pain. Initially, I wanted to study how masculinity and femininity are related to use of different types of pain relief, and whether motivation to relieve pain mediates these relationships. This was the aim of the first empirical chapter, reported in Chapter 3. However, to achieve this aim, appropriate measures were required. This chapter will review the available measures of pain coping and motivation, explain why they were not considered appropriate, and describe the development and psychometric testing of two new measures; the Pain Relief Motivation Scale (PRMS) and the Pain Relief Strategies Scale (PRSS). This chapter also documents the psychometric testing of an existing but unvalidated measure of analgesic use to serve as a secondary pain relief outcome in the following chapter.

Pain Relief Strategies

As outlined in the previous chapter, research tends to focus on gender in relation to pain experience and expression. One of the aims of this thesis was to extend such investigations to pain relief, many of which are behaviours. However, many pain coping measures lack behavioural coping strategies, particularly pain relief behaviours. Most pain coping questionnaires are targeted at cognitively coping with chronic pain, which tends to be more intractable than acute pain, making cognitively mastering or tolerating pain more achievable goals. Cognitive coping can be defined as the things one thinks in order to try to cope with a stressor, such as trying to ignore the pain (Tunks & Belissimo, 1988). Behavioural coping refers to the behaviours one might perform to try to cope with the stressor, such as doing exercise or increasing physical activity. Additionally, investigations of acute pain coping in laboratory experiments often prescribe specific cognitive coping strategies and test which strategies improve subjective pain reports with the intention to apply such results to chronic pain patients (Keogh et al., 2005; Keogh et al., 2000; Keogh & Mansoor, 2001). Therefore, it is relatively unsurprising that behavioural pain relief strategies tend to be missing from chronic pain coping measures.

To ensure there was not a pre-existing, appropriate measure of use of pain relief strategies, and to inform the development of a new measure, a review of pain coping

measures was conducted (see Table 2.1). There is evidence that it is beneficial to use pain-specific measures (Alabas, Tashani, Tabasam, et al., 2012) rather than general measures applied to pain contexts, so only pain-specific measures are discussed here. One of the most widely used measures is the Coping Strategy Questionnaire (CSQ; Rosenstiel & Keefe, 1983), a 50-item self-report measure of use of cognitive and behavioural strategies to cope with pain. The cognitive sub-scales included ignoring the pain, reinterpreting pain sensations, diverting attention, coping self-statements, praying/hoping, and catastrophizing. The behavioural sub-scales measure self-reported activity levels and increasing pain behaviours. However, following issues with reliability, validity, and inconsistent factor loadings, this measure has been revised to a 27-item measure with six subscales: ignoring pain sensations, distancing, coping self-statements, praying, catastrophizing, and distraction (Riley III & Robinson, 1997; Robinson et al., 1997). This revised and widely used version does not include the behavioural subscales (Robinson et al., 1997), and does not include a comprehensive range of pain relief strategies.

Another frequently used pain coping measure is the Pain Coping Questionnaire (Reid et al., 1998), a 39-item measure designed initially for use with children and adolescents (Keogh & Eccleston, 2006; Reid et al., 1994), but also used in adult samples (Unruh et al., 1999). The Pain Coping Questionnaire has 8 subscales: seeking social support, information seeking, problem solving, behavioural distraction, cognitive distraction, positive self-statements, internalising/catastrophizing, and externalising. However, as with the Coping Strategies Questionnaire, the behavioural items are limited to behavioural distraction and therefore neglect behavioural forms of pain relief such as taking analgesics. The Pain-Related Self-Statements Scale (Flor, Behle, & Birbaumer, 1993) also focuses solely on cognitive coping.

Another issue with pain coping measures specifically designed for chronic pain patients is that there is the assumption that respondents are experiencing pain on a fairly regular basis, possibly making them unsuitable for measuring coping with acute pain. For example, the Chronic Pain Coping Inventory (Jensen et al., 1995) measures how many days in the past week the individual has used 65 coping strategies forming 8 sub-scales: seeking social support, coping self-statements, exercise/stretching, relaxation, guarding, resting, asking for assistance, and task persistence. Although this measure includes behavioural

Table 2.1
Cognitive, Behavioural, and Pain Relief Items and Subscales for Reviewed Measures of Pain Coping

Scale	Cognitive Coping	Behavioural Coping	Pain Relief Medication Items/Subscales
Coping Strategies Questionnaire (50 items) (Rosenstiel & Keefe, 1983)	✓ 6 subscales	✓ 2 subscales	One item: "I take my medication"
Coping Strategies Questionnaire (27 items) (Riley III & Robinson, 1997; Robinson et al., 1997)	✓ 6 subscales	×	×
Pain Coping Questionnaire (Reid et al., 1998)	✓ 7 subscales	1 Subscale: Behavioural distraction	×
Pain-Related Self-Statements Scale (Flor et al., 1993)	✓ 2 subscales	×	×
Chronic Pain Coping Inventory (Jensen et al., 1995)	×	✓ 6 items	✓ 3 items (Prescription medication use only)
Pain Management Inventory (Davis & Atwood, 1996)	×	✓ 14 items	✓ 2 items (both prescription and over-the-counter)
Vanderbilt Pain Management Inventory (Brown & Nicassio, 1987) Divided into subscales: passive coping and active coping. Many items dropped for not loading during factor analysis.	✓ 11 items	✓ 15 items	One item: "Taking medication for purposes of immediate pain relief"
Pain Coping Styles Inventory (Crow et al., 1996) Divided into subscales: Interactive, Reactive, Combatant, Contractor, Victim, Distractor, Spiritual coper, Substance users, Mind over matter Full items unavailable, only abbreviations reported	✓ 6 items	✓ 43 items	One item: "medicine"

strategies, they are very much limited to coping specifically with chronic pain, for example the items measuring medication consumption relate to prescription medication for chronic pain only.

Although the Pain Management Inventory (Davis & Atwood, 1996) measures consumption of both prescribed and over-the-counter medicine amongst a range of other behavioural strategies, no cognitive strategies are included in this measure. Moreover, the instructions refer to how helpful the strategy has been over the last week, again suggesting the measure is best suited to measuring chronic pain. Although the Vanderbilt Pain Management Inventory (Brown & Nicassio, 1987) measures both cognitive and behavioural strategies, there is only one item relating to general medication consumption. Moreover, many of the items were dropped during factor analysis. Finally, although Crow, Olivet, Burry-Stock, and VanderMeer (1996)'s Pain Coping Styles Inventory was developed for acute pains, the complete 50-item measure is hard to obtain. Moreover, the inventory was designed and interpreted in relation to Copp (1974, 1985)'s coping styles (Interactive, Reactive, Combatant, Contractor, and Victim) which are not theoretically guiding my research. Moreover, the authors in the original article recognised the limitations of the structure they found based on their data of only 145 participants, in which they found four additional factors with questionable validity.

Reviewing the existing measures of pain coping strategies has revealed that most measures are designed for use with chronic pain patients, and as such, they focus disproportionately on cognitive coping strategies as ways of enduring or tolerating pain rather than consciously attempting to relieve it (see Table 2.1). I therefore decided to develop a new measure to specifically measure use of pain relief strategies for both chronic and acute pains. The development and psychometric testing of this measure is reported later in this chapter. As there are often difficulties with developing new measures, I decided to also include an existing measure of pain relief in the empirical study reported in Chapter 3. The Analgesic Attitudes, Choice, and Use Scale developed by (Vowles et al., 2014) focuses specifically on analgesics, an obvious form of pain relief, making it an appropriate choice for a secondary pain relief outcome.

The Analgesic Attitudes, Choice, and Use Scale used by Vowles et al. (2014) was developed by experts across a range of pain-related fields to study analgesic beliefs and behaviours across eight countries. The original authors proposed the items be separated into

three subscales; one measuring attitudes towards analgesics, one measuring use of analgesics, and one measuring the factors which influence choice of analgesic. However, the factor analyses reported in the original paper were based on a sample quite different to that recruited here, and the original authors did not provide instructions and scoring. As such, in order to use this measure as a secondary measure of pain relief, I decided to conduct additional psychometric testing to test the structure and reliability of the measure in my sample.

Pain Relief Motivation

As mentioned in the previous chapter, in this thesis I wanted to explore not only how sex and gender are related to pain relief as a specific form of coping, but also motivation to relieve pain. When considering pain relief from a gendered perspective, there is a strong theoretical rationale for why motivation might influence choice of pain relief. Gender norm conformity, as explained in the previous chapter, occurs when an individual behaves in accordance with pervasive social gender norms and stereotypes; often as a result of socialisation including implicit and explicit social pressures (Cialdini & Trost, 1998). As such, norm conformity can be considered from a motivational perspective. Pool and Schwegler (2007) took this approach by proposing that if an individual conforms to a behavioural norm because of reasons related to themselves only, this can be termed 'self-related motivation'. However, if their behaviour is the result of the expectations of others, this is 'other-related motivation'. Whilst interesting, this distinction is rather simplistic and does not capture the more nuanced reasons there might be underlying a behaviour. A similar, but more detailed approach, is that of Self-Determination Theory (SDT).

Here, I sought to take a Self-Determination Theory (SDT) approach to conceptualising pain relief motivation. SDT is a theory of multiple human motivations which states that type of motivation, rather than amount, is important in terms of predicting outcomes (Deci & Ryan, 2008a; Ryan & Deci, 2000). SDT suggests that behaviour can generally be regulated in two ways; autonomously or controlled (Deci & Ryan, 2008b). Autonomous motivation depicts behaving in a certain way because it is in accordance with oneself, one's values, and one's beliefs. The behaviour is enacted with a sense of autonomy and choice; it is what the individual wants to do. Conversely, controlled motivation occurs when one behaves in a certain way as a result of external pressures.

The distinction between behaving as a result of choice and volition compared to the expectations of others has clear relevance for studying pain behaviours from a gender

perspective. The previous chapter outlined how masculine and feminine gender norms can potentially pose barriers and challenges to expressing pain and seeking help. If an individual senses external pressure to respond to their pain in a way which conflicts with their own beliefs and values, this may influence their motivation to relieve pain, which in turn may predict pain outcomes. Moreover, when applied to other health behaviours, autonomous and controlled motivation are differentially related to health outcomes. There is evidence that autonomous motivation promotes healthier behaviours and lifestyles, and is more effective and stable, than controlled motivation (Edmunds, Ntoumanis, & Duda, 2007; Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004; Williams et al., 2002). As such, autonomous motivation in the context of pain relief may indicate more adaptive outcomes such as the reduction or removal of pain, improved functioning and well-being, whilst controlled motivation may inhibit these outcomes.

After deciding to take a SDT approach to study motivation to relieve pain, I reviewed the literature to explore whether any pain-related SDT measures existed. I found that motivation in the pain literature tends to refer to approach or avoidance motivation and goal content (Claes et al., 2015; Karsdorp & Vlaeyen, 2011), although autonomous and controlled motivation have been included in the pain literature in relation to motivational interviewing before pain rehabilitation (Mertens, Goossens, Verbunt, Köke, & Smeets, 2013). However, I found no measures of autonomous and controlled motivation for pain relief specifically, so decided to create a new measure for this purpose. The development and psychometric testing of this measure are reported in this chapter, alongside testing of the new measure of use of pain relief strategies, and the Analgesic Attitudes, Choice, and Use Scale (Vowles et al., 2014).

Aims

The previous chapter highlighted the areas in which our understanding of gender and pain relief are sparse. The first step in developing this knowledge was to establish how sex, gendered traits, and gender norm conformity are related to use of pain relief. To deepen this understanding, I also sought to test whether motivation mediated these relationships. Reviewing existing measures here has demonstrated that appropriate measures did not exist, and that new measures would need to be developed to answer these questions. The aim of this chapter is to establish the factor structures of the two new measures (use of pain relief and motivation to relieve pain) and validate the factor structure of the Analgesic Attitudes,

Choice, and Use Scale (Vowles et al., 2014), to allow the three measures to be used in subsequent analyses reported in the following chapter.

Method

Materials

The Pain Relief Strategies Scale. As outlined above, reviewing the existing measures of pain coping suggested that an appropriate measure of use of pain relief strategies did not exist. To achieve my aim of studying how sex and gender are related to use of pain relief, a scale which measured use of strategies specifically intended to relieve pain was required. I wanted this to include both cognitive and behavioural strategies, including taking over-the-counter and prescribed analgesics, as these are important pain relief strategies often missing from existing measures.

As discussed in the introduction and demonstrated in Table 2.1, some measures of pain coping focus on cognitive coping (Flor et al., 1993; Reid et al., 1998; Riley III & Robinson, 1997; Robinson et al., 1997; Rosenstiel & Keefe, 1983), whilst others focus on behavioural coping (Davis & Atwood, 1996; Jensen et al., 1995). Frustratingly, the two which best encompass both cognitive and behavioural coping were factor analysed in a way which provided subscales which were undesirable for this research. For example, the Vanderbilt Pain Management Inventory (Brown & Nicassio, 1987) was factor analysed into active and passive coping strategies, resulting in a number of items being dropped completely. Whilst the Pain Coping Styles Inventory (Crow et al., 1996) provides a comprehensive list of behavioural strategies, the cognitive strategies are somewhat limited, and the subscales are driven by Copp (1985)'s specific typology of pain coping.

Reviewing the existing measures highlighted that what I desired was a combination of the seven measures; one which measured how frequently individuals used a range of cognitive and behavioural strategies to relieve their pain. Moreover, I wanted the instructions and items to be relevant for acute as well as chronic pains. As such, I designed a new measure which was informed by the existing measures, as well as the guidance of pain and non-pain experts. In total, 26 items were collated to form the Pain Relief Strategies Scale (PRSS), which can be found in Appendix 1. The items included cognitive strategies such as 'ignore

the pain', social behaviours such as 'ask friends for advice', and pharmacological behaviours such as 'take a prescribed painkiller'. My aim was to establish the relationships between sex, gender, and use of pain relief, therefore the instructions needed to measure how frequently each of the strategies were used. Frequency of use was the outcome of interest for many of the existing measures, therefore a similar instruction and response format was adopted for the PRSS. Participants were asked to rate how often they used a number of pain relief strategies on a 6-point scale ranging from 0 (never) to 5 (always).

Attitudes, Choice, and Use of Analgesics Scale. This existing scale was intended to be used as a secondary outcome measure of pain relief, with the PRSS intended to be the primary outcome measure of pain relief. The scale, developed by Vowles et al. (2014), measures analgesic beliefs and behaviours using three sub-scales: attitudes towards analgesics, analgesic use, and factors influencing choice of analgesics. Attitudes towards analgesics were measured using 13 items, to which participants indicated their agreement using a 5-point scale ranging from 0 (strongly disagree) to 4 (strongly agree). An example item measuring attitudes towards analgesics is 'I would rather take a painkiller than suffer with pain'. Participants also rated the importance of 10 factors influencing their choice of painkiller on a 5-point scale ranging from 0 (not at all important) to 4 (very important), for example 'the painkiller is a brand I can trust'. Three questions assessed analgesic consumption. The first question asked whether the participant took any painkillers (over-the-counter or prescribed) over the last three months. The second asked how frequently the participant took painkillers (less often than stated on packet, exactly as stated on packet, more often than stated on packet), and the third asked what dosage they took (lower dose than stated on packet, exactly the dose stated on packet, higher dose than stated on packet).

The Pain Relief Motivation Scale. As mentioned in the introduction, I wanted to take an SDT approach to pain relief by measuring autonomous and controlled motives for relieving pain. According to SDT, autonomous and controlled motivation are placed on a motivational continuum capturing the more nuanced motives one might have for behaving in a specific way. This continuum is outlined in a sub-theory of SDT, the Organismic Integration Theory (Deci & Ryan, 1985). The theory describes four different motivational regulations: integration, identification, introjection, and external regulation.

Integration and identification are more autonomous, whilst introjection and external regulation are more controlled (Ryan & Deci, 2002). Integrated motivation reflects reasons

for a behaviour which are fully assimilated with one's self, beliefs, and needs. Identification refers to consciously acknowledging the value of the behaviour to the self, thus making the behaviour personally important. Introjection refers to when the motivation for a behaviour is internally driven, but for external reasons rather than reasons accepted and integrated with one's sense of self, such as behaving in a way to maintain self-worth. Finally, external regulation is the least autonomous, and refers to external pressure to perform a certain behaviour, often driven by the desire to gain an external reward or avoid an external punishment.

Initially, 22 items were developed to reflect these four different motivational regulations. With the help of others, I tried to generate a comprehensive list of all the reasons one might have for using a specific form of pain relief, and then tried to categorise them to best fit the four different forms of motivation outlined above. I then sent copies of this initial 22-item scale to SDT experts and pain experts from two universities for their feedback. Their feedback recommended the scale be shorted to ten or twelve items, as some of the items appeared a bit forced or repetitive. As a result, the 22 items were refined to ten items; five autonomous and five controlled (see Table 2.2). The instructions asked participants to indicate how true each reason was for how they behave when seeking to reduce or remove their pain using a 5-point scale ranging from 0 (not true of me) to 4 (very true of me). The complete PRMS can be found in Appendix 2.

Table 2.2.

Pain Relief Motivation Scale Items and Intended Motivational Construct

Item	Motivational Construct
Because of the pressure I feel from others	External (Controlled)
Because it's how others expect me to behave	External (Controlled)
Because of what others would think of me	External (Controlled)
Because of how it impacts my self-esteem	Introjection (Controlled)
Because of how it makes me feel about myself	Introjection (Controlled)
Because it is consistent with what I value	Identification or Integration (Autonomous)
Because of its impact on my health	Identification or Integration (Autonomous)
Because it is a part of who I am	Integration (Autonomous)
Because of my beliefs	Integration (Autonomous)
Because of how I was raised	Integration (Autonomous)

Design

The PRSS, Attitudes, Choice, and Use of Analgesics Scale, and PRMS were administered to participants as part of the study reported in Chapter 3. A cross-sectional

online questionnaire was used as it was deemed the most appropriate method to explore the proposed relationships and to gain sufficient participants to test the psychometrics of the new measures. Additionally, use of an online questionnaire allowed a broader audience to be reached by sharing an online URL with anyone who met the inclusion criteria.

Participants

The factor analyses reported here are based on the same sample reported in Chapter 3. The target sample was English-speaking adults (18+), as the aim of the study reported in Chapter 3 was to explore the relationships between sex, gender, motivation, and use of pain relief across a varied range of people. Participants were recruited by referral and snowball sampling, with the link to the questionnaire being shared across media and social media outlets. Once this recruitment method had been exhausted, approximately 200 participants were still required. This resulted in utilising Crowdflower, an online marketplace that allows users to complete tasks in exchange for a small monetary incentive. All Crowdflower users must be over the age of 18, therefore meeting the criteria for this study, but were in no way obligated to complete this study in particular. Using Crowdflower was suitable for this study due to the vast participant pool, as there is evidence that use of such platforms yield a more demographically diverse sample than those recruited at universities, whilst maintaining reliability (Buhrmester, Kwang, & Gosling, 2011). Two hundred participants were recruited, and each paid $1 each. This rate is usual, and does not influence motivations or quality of data (Mason & Watts, 2010).

In total, 742 participants opened the link to the questionnaire. Fifty-one individuals read the information sheet but chose not to continue. Twenty-two participants read the information sheet, provided informed consent, but dropped out during the demographics questionnaire. One hundred and eighteen participants dropped out during the remainder of the questionnaire (total drop out = 191). A further 73 participants reached the end of the questionnaire, but were removed as >5% of their data were missing. Four hundred and nine participants provided complete data sets. Seventy data sets were missing less than 5% of data, in which case the missing data were imputed using mean substitution (see *Data Screening* section below).

Overall, 74.26% of participants who opened the questionnaire reached the end of the questionnaire, but only 64.42% completed a sufficient proportion of the questionnaire (at

least 95%) to be included in the analyses. The final sample consisted of 478 participants (210 male, 268 female). Participants were aged between 18 and 66 years (*M*= 33.42 years, *SD* = 10.80, *mdn* = 31). Pain was considered 'chronic' if it had persisted for longer than three months, reported by 188 (39.3%) participants. The majority of participants were heterosexual (87.4%), single (43.3%) but living with a partner (30.1%), identified as White or White British (54.3%), were native English speakers (56.9%), living in the UK (48.7%), and held an Undergraduate degree (34.7%).

Procedure

Hard copies of the complete questionnaire pack (see Chapter 3 for all measures included) were initially piloted with staff and students to ensure that the instructions were easy to follow and there were no practical issues with completing the questionnaire. The questionnaire was then entered into Qualtrics, where anyone fluent in English and over the age of 18 with access to the link was able to complete it. Full approval was gained from the University of Bath's Psychology Ethics Committee and the Research Ethics Approval Committee for Health. Informed consent was gained for all participants before any data were collected, and participants read a written debrief at the end of the questionnaire.

General Analytic Strategy

Data screening was conducted in accordance with the recommendations of Tabachnick and Fidell (2013) to ensure the data were appropriate for factor analysis. As the PRMS and PRSS were developed for the purpose of this study, and the Analgesic Attitudes, Choice, & Use Scale (Vowles et al., 2014) had not been validated and was initially used with a large and culturally diverse sample, exploratory factor analyses seemed the most appropriate techniques at this stage of the scales' development.

The factor analyses aimed to highlight the items which most strongly marked the constructs in question, and so Principal Component Analyses (PCAs) were conducted. It is recognised that PCA differs from factor analysis, but the terms 'factor' and 'component' are used interchangeably. Varimax rotations were selected as they are the most popular approach in the field, and especially advantageous when factors are to be used as independent or dependent variables in subsequent analyses (Tabachnick & Fidell, 2013), as they are here. Factor analyses output ought to summarise the data by grouping together variables that correlate with one another, therefore any items with correlation coefficients lower than .30 or higher than .90 were excluded from analyses.

As with all factor analyses, the first step is to determine how many meaningful factors ought to be retained. It has become relatively common practice to first consider eigenvalues, with factors with eigenvalues greater than 1 considered for the final solution (Tabachnick & Fidell, 2013). It is also common to observe scree plots to suggest factor cut off points (Cattell, 1966). In addition to this, Watson et al. (1995)'s inspection techniques were utilised to identify the best solution. Factor interpretability is easier when its items correlate highly with it and do not correlate with other factors, and so items were selected as 'factor markers' for factors for which their loading was greater than or equal to 0.30 and greater than their loadings on other factors. For maximum parsimony, a second criterion was also implemented. As suggested by Bedford (1997), the major loading for each factor was only considered a marker if it was at least .020 greater than any cross-loadings.

Results

Data Screening

Missing data. The PRSS Scale had 34 missing data points across 22 of the 26 items, making the percentage of data missing across the scale 0.06%. Tests were conducted with dummy coded variables to ensure that there was not a pattern to the missing data. As there was no pattern, the missing values were imputed using mean substitution. This process was repeated for the Analgesic Attitudes, Choice, & Usage Scale which had 16 missing data points across 12 of the 28 items (0.15% missing), and the PRMS which had 9 missing data points across 7 of the 10 items (0.19% missing). Again, tests were conducted to ensure there was not a pattern to the missing data, and upon evidence that there was no pattern, the missing data were imputed using mean substitution. No cases had significant Mahalonobis distances suggesting that there were no multivariate outliers.

Distribution and outliers. *Z scores* were calculated for each of the scales to identify any univariate outliers. *Z scores* were calculated for the 26 PRSS items and ranged from -1.71 to 4.73. Tabachnick and Fidell (2013) recommend that scores greater than 3.29 indicate univariate outliers, suggesting that there were some outliers in the PRSS data. The following items contained outliers exceeding the 3.29 standard: Use medical devices (11 outliers), Acupuncture (18 outliers), Yoga (11 outliers), Drink alcohol (11 outliers). In this case, the 'outliers' refer to participants who report using certain pain relief behaviours more frequently than the rest of the sample. I certainly did not want to lose such variance, and therefore the

outliers remained in the dataset and were included in the factor analyses. For the 10 PRMS items, Z scores ranged from -2.40 to 2.85, and from -2.83 to 2.47 for the 28 Analgesic Attitudes, Choice, & Usage items. As these scores are not greater than 3.29, this suggests there are not any univariate outliers, so all data are retained and included in the analyses.

Exploratory Factor Analyses

As mentioned in the *General Analytic Strategy*, principal components analyses (PCA) are reported for the two new measures, as well as for the Analgesic Attitudes, Choice, and Use Scale (Vowles et al., 2014). As with other forms of factor analysis, this is an iterative process to find the most parsimonious and interpretable solution. The process is summarised for each scale below, with additional tables available in the appendices.

Exploratory factor analyses: The Pain Relief Strategies Scale (PRSS). The Pain Relief Strategies Scale originally contained 26 items, each referring to a different pain relief strategy (see Appendix 1). A PCA with Varimax rotation was conducted to determine the number of meaningful components to retain. Items with correlation coefficients lower than .30 or higher than .90 were excluded from the main analyses. The item 'hoping the pain will go away' was excluded as coefficients were smaller than 0.30. The optimal number of components to retain was determined using the commonly used approaches outlined in the *General Analytic Strategy*; eigenvalues, scree plots, factor markers, factor loadings, reliability alphas, and interpretation of components.

As is widely accepted in factor analysis, eigenvalues greater than 1 were considered (Tabachnick & Fidell, 2013), which indicated five components (7.78, 2.00, 1.64, 1.25, 1.05). The scree plot (see Figure 2.1) suggested between one and three possible components. Factor/component markers (see Table 2.3) were inspected, defined as items where the component loading was greater than or equal to 0.30 and greater than their loadings on other components (Watson et al., 1995). For maximum parsimony, the major loading for each component was only considered a marker if it was at least .020 greater than any cross-loadings (Bedford, 1997). Using this approach, a 2-component model was found to be the best solution, although five- and three-component solutions were also considered based on eigenvalues and the scree plot. However, the three- and five- factor solutions were rejected due to poor component reliability (alpha < .70). Tables showing the factor loadings and item and component structures for these solutions can be found in the Appendix 3. Due to these

issues, a 2-factor solution was requested and selected as the final solution due to its interpretability, parsimony, and strong reliability (see Tables 2.4 and 2.5).

Interpretation and labelling of components. The content of the two components were interpreted based on the factor markers shown in Table 2.5. Component 1 was interpreted as reflecting externally-focused, possibly visible pain relief strategies, often relying on an external agent. As such, this component was labelled Externally-Focused Pain Relief Strategies. Component 2 includes more cognitive and emotional strategies aimed at addressing the psychological experience of pain. These strategies seem to be more internally focused and potentially less observable, hence this component was labelled Internally Focused Pain Relief Strategies.

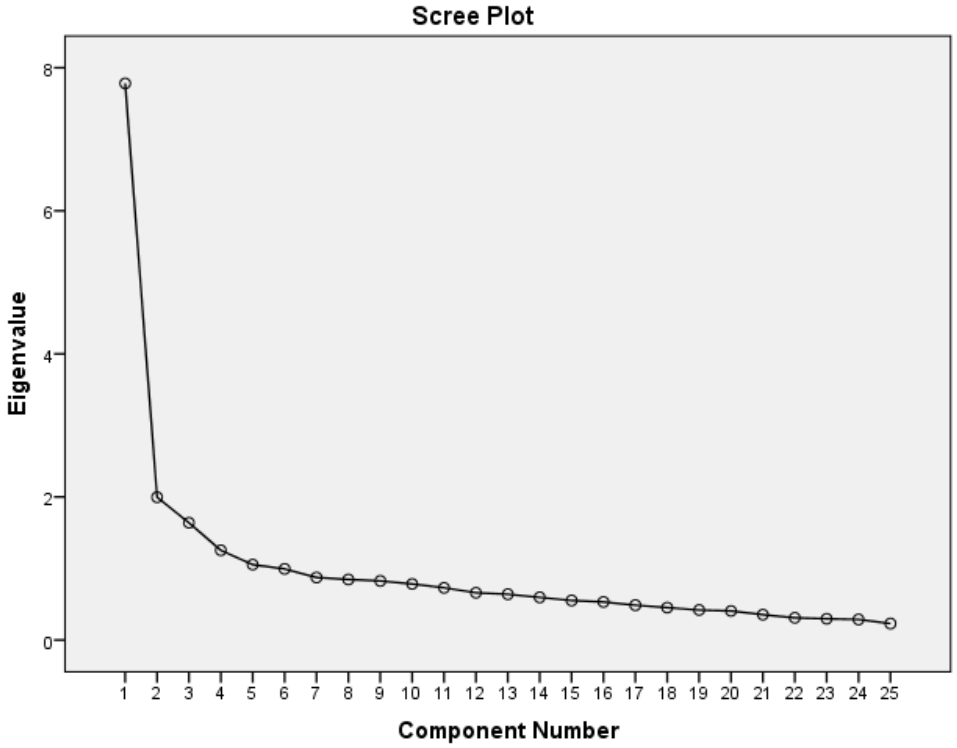

Figure 2.1. Scree plot for the Pain Relief Strategies Scale

Table 2.3.

Pain Relief Strategies Scale Component Markers

No. of Components in Solution	*No. of Markers for Component Number*				
	1	2	3	4	5
1	21(N/A)				
2	19(13)	6(5)			
3	12(10)	8(2)	5(4)		
4	10(3)	6(4)	5(3)	3(3)	
5	9(3)	6(4)	5(3)	3(3)	2(1)

Note. The numbers outside parentheses represent the number of markers using Watson, Clark, et al.'s (1995) criteria of factor loadings greater than |.30|. The numbers within parentheses represent the number of markers using Bedford's (1997) criteria of factor loading greater than |.30| and where the major loading is |.20| greater than any cross-loading

Table 2.4.

Varimax-Rotated Component Loadings for the Pain Relief Strategies Scale (2 Component Solution)

Items	Component	
	1	2
Use medical devices e.g. TENS	**.754***	.125
Acupuncture	**.725***	.147
Herbal remedies	**.660***	.175
Cold treatments	**.655***	.116
Topical treatments e.g. gel, cream	**.626***	-.022
Ask a healthcare professional for advice	**.622***	.089
Ask friends for advice	**.620***	.215
Ask family for advice	**.616***	.133
Do something to vent anger	**.604***	.354
Praying	**.585***	.098
Do something to vent frustration	.576*	.377
Meditation	.525*	.400
Massage	.525*	.173
Yoga	.515*	.320
Hot treatments	**.514***	.061
Search for information online	.423*	.342
Drink alcohol	.417*	.282
Go to bed	**.388***	.156
Take a painkiller	**.350***	-.107
Distract myself from the pain	.002	**.768***
Do something that makes me happy	.108	**.748***
Do something that makes me laugh	.312	**.663***
Ignore the pain	-.123	**.517***
Relaxation	.193	**.504***
Exercise	.333	.432*

Note. Items in bold represent markers that have component loadings greater than |.30| and are above |.20| across factors. An asterisk indicates the highest loading (above |.30|) for that item.

Table 2.5.

Item and Component Structure of Pain Relief Strategies Scale (2 Component Solution)

Component 1 (Externally Focused Pain Relief Strategies)	Component 2 (Internally Focused Pain Relief Strategies)
Use medical devices e.g. TENS	Distract myself from the pain
Acupuncture	Do something that makes me happy
Herbal remedies	Do something that makes me laugh
Cold treatments	Ignore the pain
Topical treatments e.g. gel, cream	Relaxation
Ask a healthcare professional for advice	
Ask friends for advice	
Ask family for advice	
Do something to vent anger	
Praying	
Hot treatments	
Go to bed	
Take a painkiller	
Cronbach's Alpha: .857	Cronbach's Alpha: .703

Exploratory factor analyses: Analgesic Attitudes, Choice, & Use Scale. As this scale is not validated, and instructions and scoring were not provided by the original authors, it was unclear whether the factor structure proposed by the original authors would be replicated. As such, this scale was initially analysed in the same way as the PRSS; by combining all of the items rather than separately analysing the three subscales (attitudes towards analgesics, analgesic use, and factors influencing choice of analgesics). The original scale created by Vowles et al. (2014) contained 28 items, however, they excluded four of the items during their analysis due to a failure to load, resulting in the 24-item measure being used in this study. A further two items have been removed from this PCA as correlation coefficients for both 'I believe non-medicinal methods of pain relief are preferable' and 'I only take painkillers for particularly severe pain (when the pain is preventing me from carrying out normal tasks)' were lower than 0.30. Therefore, the PCA was conducted on 22 items.

Eigenvalues above 1 suggested five components (4.82, 2.50, 1.79, 1.30, 1.26), whilst the scree plot suggested the scree occurred after the fourth component (see Figure 2.2). The number of markers for each component produced by the Varimax rotation is shown in Table 2.6. When inspecting the factor markers in more depth (see Table 2.7), it became clear that it would be very difficult to interpret this solution, particularly as it did not reflect the three subscales outlined by the original authors (Vowles et al., 2014). In addition to difficulty interpreting the components, Table 2.8 also shows that there are reliability issues with the 5-factor solution, as only the first component meets the acceptable standard of .70 for Cronbach's Alpha (Tabachnick & Fidell, 2013).

Due to these issues, several alternative solutions were tested. First, I separated the items into the three subscales (attitudes towards analgesics, analgesic use, and factors influencing choice of analgesics) proposed by Vowles et al. (2014) to try to find the best representation of the factor structure for each subscale. I conducted a PCA for each subscale using the method outlined in the *General Analytic Strategy*; the same method applied to the PRSS. The results of these tests are available in Appendix 4, however the reliability and interpretability of the subscales when factor analysed separately was no better than that of the combined approach shown in Table 2.8. This led to the decision to replicate the method of Vowles et al. (2014) in an attempt to replicate their solution, or at the very least yield a more similar, reliable solution. In accordance with Vowles and colleagues (2014), a maximum likelihood method of extraction was selected with a Promax rotation. The results of this test

are also available in Appendix 4 and show that the extracted solution was still difficult to interpret, had poor reliability, and did not align well with the results of the original authors. As a result, and as this scale was only intended as a secondary pain relief outcome following the PRSS, I decided to not include these data in subsequent analyses.

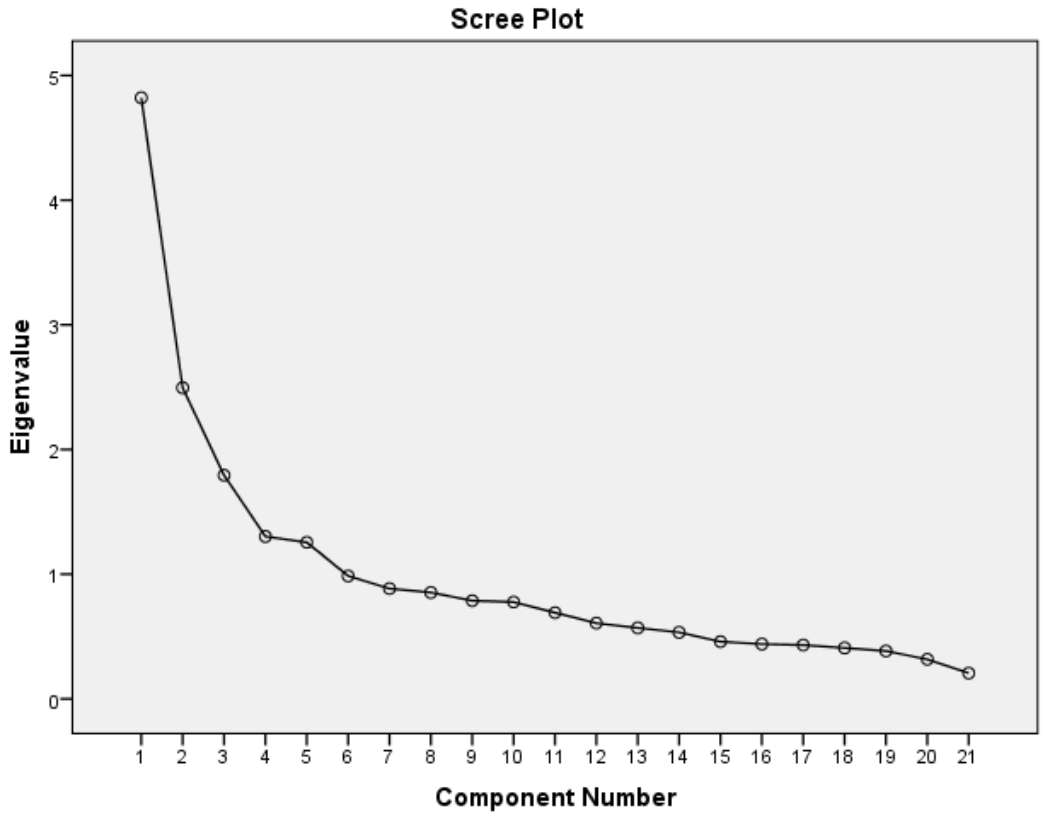

Figure 2.2. Scree plot for the Analgesic Attitudes, Choice, & Use Scale

Table 2.6.

Number of Markers per Component for 5-Factor Analgesic Attitudes, Choice, & Use Scale

No. of Components in Solution	*No. of Markers for Component Number*				
	1	*2*	*3*	*4*	*5*
1	6(N/A)				
2	5(5)	8(7)			
3	5(5)	8(5)	4(4)		
4	5(5)	8(5)	4(4)	3(3)	
5	5(5)	6(4)	4(4)	3(3)	3(2)

Note. The numbers outside parentheses represent the number of markers using Watson et al.'s (1995) criteria of factor loadings greater than |.30|. The numbers within parentheses represent the number of markers using Bedford's (1997) criteria of factor loading greater than |.30| and where the major loading is |.20| greater than any cross-loading.

Table 2.7.

Varimax-Rotated Factor Loadings of the Analgesic Attitudes, Choice, & Usage Scale

Items	*Component*				
	1	*2*	*3*	*4*	*5*
I would rather take a painkiller than suffer with pain	**.715***	.202	.080	.227	.099
Painkillers are a safe means of relieving general aches and pains	**.691***	-.113	.044	.271	.132
I believe I can take different types of painkiller together	**.689***	-.059	.035	-.180	.066
I take the painkiller I think will remove my pain as quickly as possible	**.654***	.305	.186	.093	.158
I take different painkillers for different types of pain	**.560***	.233	.252	-.354	.192
I am worried about the negative side effects when I take a painkiller	-.527	.348*	.260	-.052	.044
The painkiller is a brand I can trust	-.124	**.621***	-.016	.409	-.033
The painkiller is stronger than others	.290	**.615***	-.012	.185	.011
The painkiller targets a specific type of pain	.068	**.603***	.090	.005	.343
Recommendation from healthcare professional	-.178	**.589***	.099	.022	.213
I take a painkiller as soon as pain occurs	.487	.516*	.070	.225	-.342
I take a weaker painkiller to start with and will only 'upgrade' to a	.103	.021	**.794***	-.009	.047

stronger painkiller if pain persists					
I take a small dose initially, then increase this if the pain does not diminish	.133	.110	**.777***	.123	-.061
I think most painkillers are too strong to take for everyday aches and pains	-.363	.138	**.560***	-.019	.098
I wait for a short period of time before taking a painkiller and then, if pain persists, will take one	.268	-.136	**.493***	.220	.223
The painkiller is suitable for all types of pain	.113	.186	.104	**.696***	.077
The painkiller is value for money	.076	.003	.099	**.652***	.172
The painkiller is easy to take (e.g. easy to swallow)	.001	.270	.001	**.555***	.152
The painkiller is safe to take	.078	.024	.115	.175	**.762***
How long pain relief lasts	.197	.440	.042	.205	**.645***
How quickly pain is removed	.257	.450	.002	.259	.586*

Note. Items in bold represent markers that have factor loadings greater than |.30| and are above |.20| across factors. An asterisk indicates the highest loading (above |.30|) for that item.

Table 2.8.

Item and component structure of Analgesic Attitudes, Use, & Choice Scale

Component 1	Component 2	Component 3	Component 4	Component 5
I would rather take a painkiller than suffer with pain	The painkiller is a brand I can trust	I take a weaker painkiller to start with and will only 'upgrade' to a stronger painkiller if pain persists	The painkiller is suitable for all types of pain	The painkiller is safe to take
Painkillers are a safe means of relieving general aches and pains	The painkiller is stronger than others	I take a small dose initially, then increase this if the pain does not diminish	The painkiller is value for money	How long pain relief lasts
I believe I can take different types of painkiller together	The painkiller targets a specific type of pain	I think most painkillers are too strong to take for everyday aches and pains	The painkiller is easy to take (e.g. easy to swallow)	
I take the painkiller I think will remove my pain as quickly as possible	Recommendation from healthcare professional	I wait for a short period of time before taking a painkiller and then, if pain persists, will take one		
I take different painkillers for different types of pain				
Cronbach's Alpha: .758	Cronbach's Alpha: .647	Cronbach's Alpha: .616	Cronbach's Alpha: .569	Cronbach's Alpha: .585

Exploratory factor analyses: The Pain Relief Motivation Scale. As for the other measures, a PCA with Varimax rotation was conducted to determine the number of meaningful components to retain for the PRMS. No items were excluded from the PCA as all correlation coefficients were between .30 and .90. Eigenvalues greater than 1 indicated two components (4.87 and 1.53), as did the scree plot (see Figure 2.3). Table 2.9 displays the number of markers for each component, and Table 2.10 presents individual item loadings and markers. The structure of this two-factor solution is shown in Table 2.11, with both components having reliability alphas greater than 0.70. Due to the good reliability, interpretability, and parsimony, no other solutions were generated, and this two-component model was chosen as the final solution.

Interpretation and labelling of components. As mentioned, the two-factor solution for the PRMS was accepted in part due to the ease of interpretation. However, the structure of this solution does not quite match the intended structure shown in Table 2.2. This scale was designed to measure autonomous and controlled motives for relieving pain, but the way in which the items loaded onto the components did not quite reflect this. For example, the items 'because of how I was raised' (intended to measure autonomous motivation) and 'because of how it impacts my self-esteem' (intended to measure controlled motivation, specifically introjected motivation, which is often characterised by self-esteem contingencies), did not load onto either component. Moreover, 'because of how it makes me feel about myself' was also intended to measure introjected motivation, but loaded onto Component 2 alongside other, more autonomous motives.

It seems that rather than capturing the nuanced distinctions between the different types of autonomous and controlled motives, the components instead reflect the **source** of the motivation, i.e. from within the self versus from others. For example, each of the factor markers for Component 1 allude to the influence of other people in their reasoning, whilst the factor markers for Component 2 focus more on the individual, their self-identity, values, and beliefs. These distinctions seem to better reflect the self- and other-related motivational components proposed by Pool and Schwegler (2007) rather than Ryan and Deci's (2002) Organismic Integration Theory. As such, Component 1 was labelled 'other-related motivation' rather than controlled motivation, and Component 2 was labelled 'self-related motivation' rather than autonomous motivation.

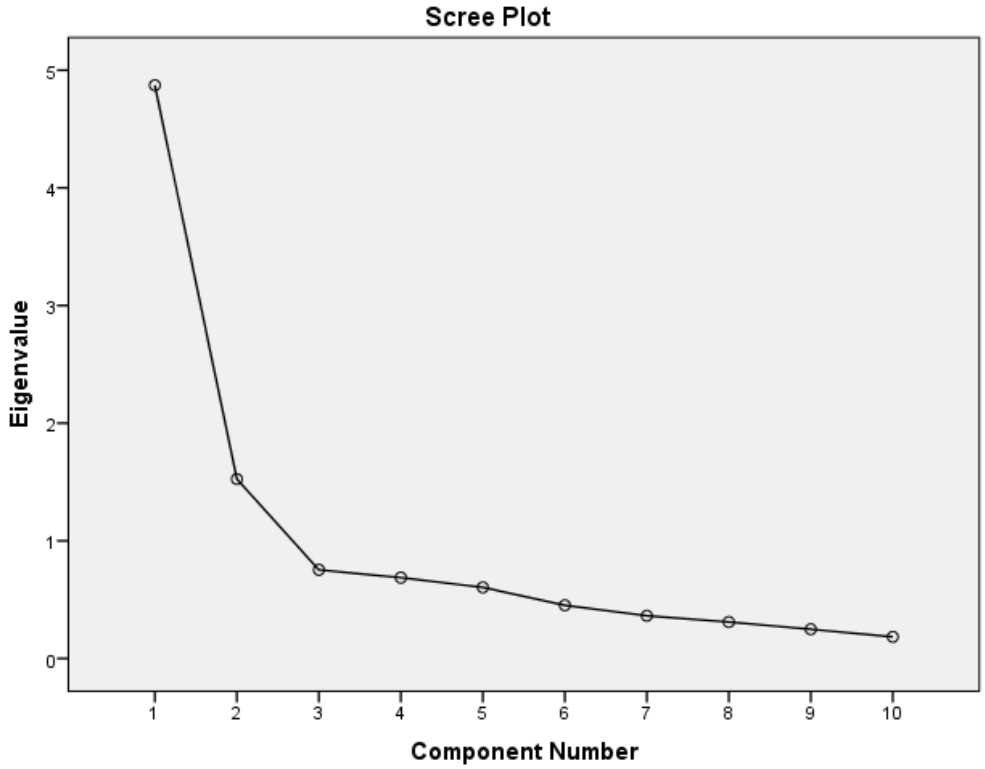

Figure 2.3. Scree plot for the Pain Relief Motivation Scale

Table 2.9.

Pain Relief Motivation Component Markers

No. of Components in Solution	*No. of Markers for Component Number*	
	1	2
1	6(N/A)	
2	6(3)	7(5)

Note. The numbers outside parentheses represent the number of markers where component loadings were greater than |.30|. The numbers within parentheses represent the number of markers had loadings greater than |.30| and where the major loading is |.20| greater than any cross-loading.

Table 2.10.
Varimax-Rotated Factor Loadings for the Pain Relief Motivation PCA

	Component	
	1	2
Because it's how others expect me to behave	**.911***	.143
Because of the pressure I feel from others	**.886***	.083
Because of what others would think of me	**.854***	.259
Because of how I was raised	.453*	.442
Because it is a part of who I am	.239	**.792***
Because it is consistent with what I value	.268	**.787***
Because of how it makes me feel about myself	.284	**.753***
Because of its impact on my health	-.139	**.650***
Because of my beliefs	.370	**.581***
Because of how it impacts my self-esteem	.552	.558*

Note. Items in bold represent markers that have factor loadings greater than |.30| and are above |.20| across factors. An asterisk indicates the highest loading (above |.30|) for that item.

Table 2.11.
Item and Component Structure of Pain Relief Motivation Scale

Component 1 (Other-Related Motivation)	*Component 2 (Self-Related Motivation)*
Because it's how others expect me to behave	Because it is a part of who I am
Because of the pressure I feel from others	Because it is consistent with what I value
Because of what others would think of me	Because of how it makes me feel about myself
	Because of its impact on my health
	Because of my beliefs
Cronbach's Alpha: .901	Cronbach's Alpha: .811

Discussion

The aim of this chapter was to establish the factor structures of the PRSS and PRMS, and to validate the factor structure of the measure of Analgesic Attitudes, Choice, and Use Scale (Vowles et al., 2014) to allow the three measures to be used in subsequent analyses reported in the following chapter. The primary outcome is the PRSS, and the results of the PCA suggest that this scale has two components.

The Pain Relief Strategies Scale

The two PRSS components were labelled 'externally-focused pain relief strategies' and 'internally focused pain relief strategies'. The item loadings required new composite labels, as the way the strategies loaded onto each of the components was not in fitting with previously used labels. For example, the two components do not seems to reflect illness versus wellness focused strategies whatsoever, but bear some resemblance to active and passive coping. Jensen et al. (1991) define passive strategies as those which involve relinquishing control to an external agent, such as medication, therefore comparable to Component 1 ('externally-focused pain relief strategies'). Active strategies are defined by Jensen and colleagues as some form of instrumental action on the part of the individual to manage their pain, however Component 2 ('internally focused pain relief strategies') is less reflective of this. Indeed there are many strategies for which it is unclear whether they would be considered 'active' or 'passive' by these standards, and therefore it did not seem appropriate to use these labels.

The components also resemble problem versus emotion focused coping, with Component 1 containing seemingly problem-focused strategies whilst Component 2 seems to contain more emotion-focused strategies. However, doing something to vent anger (Component 1) would presumably be considered an emotion-focused strategy rather than a problem-focused strategy, making these labels also unsuitable. Finally, although Component 1 might seem to generally reflect behavioural coping and Component 2 cognitive coping, there are again exceptions which suggest these are not the most appropriate labels. For example, doing something that makes one happy, or laugh, would presumably be behavioural strategies, but in this instance have loaded onto Component 2. Similarly, it is debatable whether praying would be considered cognitive or behavioural.

It seems that the structure of this questionnaire specifically focusing on use of pain relief is psychometrically different to those focusing on pain coping generally. This is

unsurprising given that most of the existing measures focus on cognitive coping strategies. As such, different labels were ascribed: externally-focused strategies (Component 1) and internally focused strategies (Component 2). Primarily, these labels differentiate between the more external and potentially more visible strategies, compared to those more internal and hidden. Strategies in the 'externally-focused pain relief strategies' subscale would most clearly demonstrate to others that something was wrong, whereas those in the 'internally focused pain relief strategies' subscale are less likely to indicate pain to others. The components will serve as interesting outcomes, as one might predict that men use more internally focused pain relief strategies due to the potentially less visible nature, meaning the strategies might be less likely to reveal any weakness and subsequently threaten masculinity. Indeed, one might expect masculine traits and masculine norm conformity to be positively related to use of these strategies. Conversely, women, or individuals with a high number of feminine traits and who highly conform to feminine norms, might be more likely to use externally-focused pain relief strategies which although are more likely to make the pain known to others, also seem to more directly address the source of the pain.

Analgesic Attitudes, Use, & Choice Scale

The inability to find a reliable and interpretable factor solution for the Analgesic Attitudes, Use, and Choice Scale posed concerns about the utility of the instrument. As such, it has not been included in subsequent analyses. The inability to yield a reliable or similar factor structure to that of Vowles et al. (2014) may be the result of methodological differences. For example, they did not provide detail on how their participants were instructed to respond to the items, so it is possible that different questions were asked. Additionally, their sample was approximately seventeen times larger than this sample, and far more culturally diverse. This likely explains the differences in participant responses and why the factor structure could not be reproduced, but does not explain why I was unable to find a coherent structure in the present sample.

The Pain Relief Motivation Scale

The 2-factor PRMS reflects the motives proposed by Pool and Schwegler (2007) and were labelled as such. According to Pool and Schwegler, other-related motives refer to whether important others believe that the individual should perform the behaviour in question, whereas self-related motives refer to the individual's own reasons and beliefs for engaging in the behaviour. Although these do not quite match the autonomous and controlled

motivational components initially intended, the components will still serve as interesting and informative potential mediators of the relationships between sex and gender factors and use of pain relief.

Next Steps

The factor analytic solutions reported here for the PRMS and PRSS will be used as mediators and outcomes respectively in the following chapter. This will be an empirical study testing for sex and gender differences in use of pain relief, and any mediating role of self- and other-related motives for relieving pain.

Chapter Three: Sex and gender as predictors of use of pain relief

Primary paper:
Wratten, S., Eccleston, C., & Keogh, E. (in prep). Predicting use of pain relief: The role of sex, gender and motivation.

Background

The overarching aim of this thesis was to advance our understanding of how sex and gender are related to use of pain relief, and a secondary aim was to explore the role of motivation in relation to sex, gender, and pain relief. The first step in achieving these aims was to study how sex, masculinity, and femininity are related to pain relief, and whether motivation to relieve pain mediates these relationships. However, to do so, appropriate measures of use of pain relief and pain relief motivation were required. The previous chapter documented the development and psychometric testing of these two new measures.

Following the results of the factor analyses in the previous chapter, I now present the first empirical chapter of this thesis. As mentioned, the aim of the first study was to investigate the relationships between sex, gender, and use of pain relief, and whether motivation to relieve pain mediated these relationships. Based on the results of the previous chapter, the outcome measure (use of pain relief) can be divided into two specific types: internally- and externally-focused pain relief strategies. These will serve as the outcomes in this chapter, allowing me to test whether sex and gender predict use of internally- and externally-focused pain relief strategies. Although I had intended to include the Analgesic Attitudes, Choice, and Use Scale as a secondary pain relief outcome measure, during factor analyses I was unable to find an appropriate solution for this measure, and therefore I chose not to use this as an outcome in this study. As mentioned in the aim, I was also interested in whether motivation to relieve pain mediated the relationships between sex, gender, and use of pain relief. The factor analyses in the previous chapter suggested two components of pain relief motivation: self-related and other-related motivation. These serve as the mediators in this chapter.

There are several important strengths of this first empirical study. Firstly, it investigates gender as well as sex in relation to use of pain relief, extending previous investigations of gender and pain expression outlined in Chapter 1. Moreover, two forms of gender are included; endorsement of gendered traits and conformity to gender norms. Endorsement of gendered traits refers to how much an individual considers themselves to hold stereotypically masculinise traits (e.g. independent) and feminine traits (e.g. emotional), whereas conformity to gender norms refers to the extent to which an individual behaves in stereotypically masculine and feminine ways. Taking a multifaceted approach to gender allowed me to gain a better understanding of how the different ways in which gender can

manifest itself in an individual are differentially related to the way in which they use pain relief.

Another strength is the use of a pain-specific measure of motivation. There is evidence that pain-specific measures yield greater effect sizes (Alabas, Tashani, Tabasam, et al., 2012) and that motives have a greater influence in contexts in which they are relevant (Pool & Schwegler, 2007). As such, this study is strengthened by the new Pain Relief Motivation Scale. Similarly, this study is also strengthened by the inclusion of a wide range of pain relief strategies in the new Pain Relief Strategies Scale. Whilst other measures tend to be designed to measure cognitive coping strategies for chronic pain, this study documents a broader investigation of how men and women seek to relieve acute and chronic pains, and the roles of gender and motivation in these relationships.

Finally, mediation is tested using a linear regression framework embedded within PROCESS for SPSS (Hayes, 2013). PROCESS overcomes the limitations of traditional causal steps/simple mediation models such as Baron and Kenny's (1986), particularly the oversimplification of the relationship between X and Y and the need for a significant correlation in order to test causality (Hayes, 2009). This allowed me to thoroughly test the direct, indirect, and total effects of all of my chosen variables without the limitations of the causal steps approach. Moreover, the Sobel test of inference often used alongside the causal steps approach to test the indirect effect of *X* on *Y* through *M* is limited by the assumption of a normal sampling distribution and therefore has low power to detect indirect effects (Hayes, 2013). The tests embedded within PROCESS are able to overcome these issues using bootstrapped confidence intervals which respect any irregularity of the sampling distribution, thus yielding more accurate inferences.

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<tr><td colspan="9">Predicting use of pain relief: The role of sex, gender and motivation</td></tr>
<tr><td colspan="9">Publication status (tick one)</td></tr>
<tr><td>Draft manuscript</td><td></td><td>Submitted</td><td></td><td>In review</td><td>X</td><td>Accepted</td><td></td><td>Published</td><td></td></tr>
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<tr><td>Candidate's contribution to the paper (detailed, and also given as a percentage)</td><td colspan="9">The candidate contributed to/ considerably contributed to/predominantly executed the...

Formulation of ideas (70%): I proposed this idea based upon the results of my literature review, with help from supervisors to refine the idea

Design of methodology (50%): the methodology was a joint discussion between myself and my supervisors with the help of their collaborators

Experimental work (100%): I conducted all of the experimental work myself

Presentation of data in journal format (80%): I drafted the paper and received critical feedback from co-authors</td></tr>
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"Predicting use of pain relief: The role of sex, gender and motivation"

Abstract

Objective. Sex differences in pain experiences are well-documented, but little is known about the influence of sex and gender variables on how people use pain relief. This study tested the roles of sex and gender in predicting use of internally- and externally-focused pain relief strategies, and whether motivation to relieve pain mediated these relationships.

Design. A cross-sectional design using an online questionnaire was used.

Main Outcome Measures. Four hundred and seventy eight participants reported on their pain experiences, use of pain relief, motivation to relieve pain, identification with masculine and feminine traits, and conformity to masculine and feminine norms.

Results. Masculine traits were positively related to use of internally focused strategies, whereas conformity to feminine norms positively predicted use of externally-focused strategies. Both self- and other-related motivation had a mediating role in the relationships between gender factors and reported use of pain relief.

Conclusion. Gender-related variables played a stronger role than sex in explaining the use of pain relief. Moreover, motivation interacts with gender when predicting use of internally focused and externally focused pain relief strategies. The implications are that pain relief behaviours may be gendered, which may in turn be relevant for how we manage pain and understand variation in treatment adherence.

Keywords: sex, gender, motivation, pain, pain relief

Introduction

Sex has emerged as a predictor of variation in pain experiences with striking consistency (Barsky, Peekna, & Borus, 2001; Bartley & Fillingim, 2013; Pieretti et al., 2016). Females experience more severe and frequent pains than males, and exhibit greater sensitivity to induced pain. Understanding sex differences in pain experiences such as these have important clinical implications, such as the evidence that despite the greater female pain prevalence, women's pain is often underestimated and undertreated (Hoffmann & Tarzian, 2001; Schäfer, Prkachin, Kaseweter, & Williams, 2016). Whilst biological mechanisms (e.g., sex hormones) help explain these differences, they do not fully account for them (Berkley, 1997; Melchior, Poisbeau, Gaumond, & Marchand, 2016). This has led to a focus on psychosocial factors such as coping, for which there is evidence of sex differences. Unruh, Ritchie, and Merskey (1999) found that women used more pain coping strategies than men, including problem solving, palliative behaviours, positive self-statements, and social support. Similarly, Affleck et al. (1999) found that women sought emotional support and spiritual comfort more than men, as well as using relaxation and distraction techniques more frequently. The greater utilization of social support and positive self-statements amongst females compared to males was again found by Keogh and Eccleston (2006), who also demonstrated that adolescent females are more likely to internalize and catastrophize. These findings are consistent with the general picture from the coping literature that most strategies are used more frequently by women, especially emotion-focused strategies such as seeking social support (Almquist, Östberg, Rostila, Edling, & Rydgren, 2014; Cornwell, 2011; Tamres, Janicki, & Helgeson, 2002).

Some have failed to find sex differences in pain coping strategies, however (Edwards, Augustson, & Fillingim, 2000; Grossi, Soares, & Lundberg, 2000; Koopman et al., 2004; Racine et al., 2015). This could be due to too broad a definition of 'coping'. Tamres et al. (2002) argue that the conceptualisation of coping is too broad, which poses challenges when examining specific sex differences. Coping can, however, be narrowed to focus on specific ways of relieving pain; defined for the purpose of this research as any conscious attempt to reduce or remove pain. The use of pain relief has the potential to transform the individual's experience of pain and its impact on their life, making it an important goal for many. Vowles et al. (2014) found greater use of analgesics in women compared to men, reflecting a broader tendency of women using medication more than men (Simoni-Wastila, 2000; Verbrugge,

1985). Similarly, men are more likely to drink alcohol in an attempt to manage their pain (Riley & King, 2009), again supporting the wider literature showing men to be more likely to use alcohol as a way of coping (Verbrugge, 1985). Beyond analgesics and alcohol, the pain coping literature has yet to cover a broad range of analgesic behaviours, or consider the variability within men and women. One approach is to go beyond binary sex categories and consider constructs such as gender. Whilst the term 'sex' refers to biological differences between men and women (Unger, 1979), 'gender' refers to the more psychological and sociocultural attributes typically associated with one's sex, for example masculinity and femininity (Clayton & Tannenbaum, 2016). Gender factors may explain the inconsistencies between previous studies exploring sex differences in pain coping by accounting for within-sex variability (Fiske, 2010).

Gender has received less attention in the pain literature, although there is evidence it plays a role (Alabas, Tashani, Tabasam, & Jonhson, 2012). However, gender is well recognised as a predictor of other health behaviours (Lyons, 2009). Behaviours become gendered based on gender ideals for men and women in a given society at a given time. Focusing on pain-relevant attributes, 21st century Western societies prescribe stoicism, self-reliance, and independence for men, and emotional expression and sensitivity for women (Connell & Messerschmidt, 2005; Courtenay, 2000). Behaviours related to these attributes therefore become gendered, and gender identity is established and reinforced by enacting these gendered behaviours (Sellaeg & Chapman, 2008). There are also social pressures to conform to gender norms, with negative consequences directed to those who violate them (Cialdini & Trost, 1998; Bosson, Taylor, & Prewitt-Freilino, 2006). The pressure to avoid these consequences may be especially salient during a pain experience, in which one may already feel vulnerable, requiring a gender-conforming pain relief strategy.

This raises the question as to whether gender differentially influences the use of overt pain relief strategies compared to covert, more cognitive-emotional strategies. This is particularly relevant when considering men and masculinity, as any way of relieving pain that might signal the pain to others could threaten masculinity and result in punishment (Bosson et al., 2006). It is possible that men and women respond to pain, and use pain relief, based on their perceptions of what is considered acceptable by society for them based on their sex, in order to avoid negative consequences. That said, not everyone conforms to gender norms in this way, and this may be the case in the face of debilitating pain. One must consider motivation to relieve pain. In relation to norm conformity, self-related and other-related motives may be relevant (Pool & Schwegler, 2007). Applied to pain relief, self-related

motivation would occur when the choice of pain relief is selected based on one's own personal beliefs and values about their health and use of pain relief. Other-related motivation might motivate an individual to choose pain relief based on the perceived expectations and judgements of others. Again, this may depend on whether the method of pain relief is overt or covert.

In this study, our aim was to see whether existing sex differences extend to ways of relieving pain, or whether gender-related factors are better predictors of use of pain relief than categorical sex. We also sought to determine whether motivation to relieve pain mediates these relationships. These aims were theoretically informed, but due to the lack of theories and models of gender and pain, this study was very exploratory and therefore specific a priori hypotheses were not possible.

Method

Design

A cross-sectional online questionnaire design was employed to test the contributions of sex and gender in predicting pain relief behaviours, and whether types of motivation mediate these relationships. The predictor variables were sex, identification with masculine traits, identification with feminine traits, conformity to masculine norms, and conformity to feminine norms. Age, pain intensity, and pain chronicity were controlled for, as they may influence use of pain relief (Fisher, Ballantyne, & Hawker, 2012; Keefe et al., 1987). The mediator variables were self-related motivation and other-related motivation. The outcome variable was the reported frequency of use of a range of pain relief strategies.

Participants

Adults aged 18 or over, with a self-reported good understanding of English and access to the internet were recruited. The questionnaire was completed by 240 male and 311 females (*M*age = 34.06 years, *SD* = 11.52).

Measures

Sample demography. A questionnaire documented participants' age, sex, sexual orientation, marital status, living status, native language, country of residence, ethnicity, and highest educational qualification.

Pain. Types of pain over the past three months was assessed using a checklist of 19 common pains, plus an open-ended 'other' option. The 'most important' pain was used as a reference point when reflecting on pain and methods of relief used. Participants reported the location (from 13 body locations), cause (free text box), chronicity (whether the pain has persisted for more than 3 months, as defined by Merskey and Bogduk [1994]), and frequency of experience over the past three months (7-point Likert scale ranging from 'at all times' to 'less than once a month'). The intensity and interference of their 'most important' pain was measured using the Chronic Pain Grading method (Von Korff, Ormel, Keefe, and Dworkin (1992), adapted for use with acute as well as chronic pains, for which we found strong reliability ($\alpha = 0.90$). Our questions asked about the intensity of their 'most important' pain (from 0 = 'no pain at all' to 10 = 'pain could not be worse'), how much it interfered with their daily activities (from 0 = 'no interference' to 10 = 'unable to carry on any activities'), how much it changed their ability to take part in recreational, social, and family activities (from 0 = 'no change' to 10 = 'extreme change'), and how much it changed their ability to work including housework (from 0 = 'no change' to 10 = 'extreme change').

Perceived ability to control and reduce pain was recorded using an adapted version of Rosenstiel and Keefe (1983)'s Pain Coping Strategies Questionnaire ($\alpha = 0.76$). The two items were adapted to ask about the participant's perception of their control over and ability to decrease their pain based on "the things you generally do to reduce or remove your pain" instead of "the things you do to cope or deal with your pain, on an average day" in order to make it more clearly linked to pain relief, and to make it accessible for participants without chronic pain.

Gendered traits. Identification with masculine and feminine traits was measured using the Personal Attributes Questionnaire (PAQ) (Spence, Helmreich, & Stapp, 1975). Participants were presented 24 characteristics and indicated where they fell on a 5-point scale ranging from '*Not at all [trait]*' to '*Very [trait]*'. Items are scored on two subscales, to indicate the degree to which they 'self-identify' as possessing masculine and feminine traits. The PAQ is highly consistent in both sexes and across ages, with clear masculine and feminine subscales (Helmreich, Spence, & Wilhelm, 1981). We found masculinity alphas of .78 and .69 for men and women respectively, and femininity alphas of .85 and .82 respectively.

Conformity to masculine norms. Parent and Moradi (2011)'s Conformity to Masculine Norms Inventory-46 (CNMI-46) consists of 46 items describing stereotypically masculine attitudes, beliefs, and behaviours. Both male and female participants indicated their agreement with each statement in relation to their own actions, feelings, and beliefs using a 4-point scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). The CNMI-46 has good reliability, convergent validity, and discriminant validity in college men (scale α= .85), and is considered psychometrically valid with women as well (Parent & Smiler, 2013). We found the CMNI is a reliable tool for measuring conformity to masculine norms in both men (α = .85) and women (α = .89).

Conformity to feminine norms. Parent and Moradi (2010)'s Conformity to Feminine Norms Inventory-45 (CNFI-45) consists of 45 items describing stereotypically feminine attitudes, beliefs, and behaviours. Similar completion and scoring is used to that reported for the CNMI-46. High internal reliability for the CNFI-45 in women (α = .87) has been reported (Mahalik et al., 2005). The present study further supports the high internal consistency of the CFNI-45 in women (α = .83), and provides new evidence for reliability in men (α = .80).

Use of pain relief. Existing measures of pain coping tend to measure cognitive coping strategies, designed for use with chronic pain patients. As the focus of this study was ways of relieving pain specifically (including behavioural as well as cognitive strategies), in individuals with both chronic and acute pain, we developed an inventory of different pain relief strategies that people might use. Twenty-six analgesic strategies emerged from the literature. The items included social behaviours such as 'ask friends for advice', cognitive behaviours such as 'ignore the pain', and pharmacological behaviours such as 'take a painkiller'. Participants were asked to rate how often they used each strategy when in pain on a 6-point scale ranging from 0 (*never*) to 5 (*always*).

Principal Components Analysis (PCA) with Varimax rotation revealed two components based on eigenvalues (< 1), scree plot, and maximum interpretability and parsimony (Watson et al., 1995; Bedford, 1997). The first component reflects turning to external sources to try to relieve pain, including asking for help, praying, acupuncture, and analgesics, and was therefore labelled 'Externally Focused Strategies' (13 items, α = .86). The second component reflects strategies which address the more internal, cognitive-emotional experience of pain, such as ignoring the pain or distracting oneself from the pain, and was therefore labelled 'Internally Focused Strategies' (5 items, α = .70). Higher scores

indicate more frequent use of cognitive-emotional pain relief strategies, and more frequent use of pain relief strategies involving an external agent respectively. The results of the PCA are available in the supplementary materials.

Motivation to relieve pain. In addition to reported use of pain relief, we were also interested in motivation to relieve pain, specifically whether choice of pain relief stemmed from personal beliefs and/or the expectation of others. Due to the lack of appropriate measures, a new 10-item scale was generated based on the motivational constructs proposed by Pool and Schwegler (2007) and applied specifically to pain relief. Participants were asked to rate how true of themselves they found each reason for their choice of pain relief to be on a 5-point scale ranging from 0 (*not true of me*) to 4 (*very true of me*).

A PCA with Varimax rotation was conducted, resulting in the extraction of two components. The first was labelled Self-Related Motivation (5 items, $\alpha = .81$) and reflects using pain relief in accordance with personally held values and beliefs. The second, Other-Related Motivation (3 items, $\alpha = .90$), occurs when choice of pain relief is the result of perceived external pressure/expectations. The PCA is in the supplementary materials.

Additional measures. We also administered the 31 questions from Vowles et al. (2014) assessing attitudes towards analgesics, use of analgesics, and factors influencing choice of painkiller. The measure was intended as an additional outcome variable, but factor analysis failed to provide a clear structure which could be used in subsequent analyses.

Procedure

A target of 500 participants was set as this is considered a good sample size for conducting factor analyses (Comrey & Lee, 2013). Recruitment involved referral and snowball sampling, utilising media and social media advertising. We also used Crowdflower, an online marketplace that allows users to complete tasks for a small monetary incentive. Such platforms yield a more demographically diverse sample than those recruited at universities, whilst maintaining reliability (Buhrmester, Kwang, & Gosling, 2011; Mason & Watts, 2010). Two hundred participants were recruited via Crowdflower, and paid $1 each. All participants read a detailed information sheet before providing informed consent to participate.

Screening and Analysis

Variables were examined for missing values and test assumptions. Participants who completed the questionnaire but had more than 5% missing data (N= 73) were excluded. Those with less than 5% missing (N= 73) were imputed using mean substitution, and checked to ensure they did not score significantly differently to participants with complete data on similar variables ($p < .05$).

Outliers were examined using a combination of boxplots and Z Scores. Kolmogorov-Smirnov tests were also conducted to indicate the normality of the distribution. Tests were significant for all variables, which is common in larger samples (Tabachnick & Fidell, 2013). Visual exploration of histograms confirmed that variables were not normally distributed, and transformations were conducted. However, as this did not improve normality, untransformed data were used (Tabachnick & Fidell, 2013).

Sex differences in use of individual pain relief strategies were initially explored (see Appendix 5). Next, two multiple mediation models were tested with an ordinary least squares regression framework using PROCESS for SPSS Version 2.10 (Hayes, 2013). PROCESS is an observed variable path analysis modelling tool, used here to estimate the direct and indirect effects in multiple mediator models; one for internally focused strategies, and one for externally focused strategies. PROCESS allows multiple mediator and predictor variables. Bootstrapping was used to respect any irregularity of the sampling distribution (Hayes, 2013) by estimating the effects based on 10,000 bias-corrected bootstrap samples. The same custom seed (5235) was used in both models to ensure the bootstrapped confidence intervals were based on the same set of the 10,000 resamples. The criterion for statistical significance was set at <0.05 throughout.

Results

Descriptive Statistics

Following data screening, the final sample consisted of 478 participants (210 male, 268 female). This sample size is appropriate given 462 participants are required to detect even the smallest effects when using bias-corrected bootstrap mediation analyses (Fritz & MacKinnon, 2007), as we use here. Participants were aged between 18 and 66 years (M= 33.42 years, SD = 10.80, mdn = 31). Pain was considered ‘chronic’ if it had persisted for longer than three months, reported by 188 (39.3%) participants. Sexuality, ethnicity, education, country of residence and types of pain are shown in Table 3.1.

Table 3.1.
Sample demography

Variable		Percentage
Self-identified 'most important' pain	Back pain	18.4%
	Headache	9.4%
	Menstrual pain	7.9%
	Dental pain	6.3%
	Migraine	4.6%
	Sports injury	4.6%
	Muscular pain	4.4%
	Stomach pain	4.2%
	Neck pain	4.2%
	Arthritis	4.2%
	Cold/Flu	2.7%
	Major Injury	1.5%
	Minor Injury	1.5%
	Post-surgical pain	1.0%
	Nerve damage	1.0%
	Sciatica	0.8%
	Sore throat	0.6%
	Throat infection	0.6%
	Hangover	0.6%
	CRPS	0.2%
	Multiple Sclerosis	0.2%
	Carpal Tunnel	0.2%
	Skin inflammation	0.2%
	Foot pain	0.2%
	Other/Missing	20.5%
Sexuality	Heterosexual	87.4%
	Homosexual	6.5%

	Bisexual	4.4%
	Asexual	0.4%
	Pansexual	0.4%
	Prefer not to say	0.8%
Ethnicity	White/European	71.8%
	Mixed	0.8%
	Black	0.4%
	Unclear/Missing	27%
Country of Residence	United Kingdom	48.7%
	Central Europe	15.1%
	Asia	10.1%
	Eastern Europe	9.7%
	South America	4.8%
	USA	3.8%
	Canada	1.5%
	Australia	0.6%
	Missing/Other	5.7%
Highest Educational Qualification	Undergraduate	34.7%
	Masters	27.6%
	High School	12.1%
	A-levels	11.1%
	Community College	5.9%
	Doctorate	5.4%
	Other/Missing	3.2%

Predictors of Internally Focused Strategies

Table 3.2 presents the means, standard deviations, and Holm-Bonferroni corrected correlations (Gaetano, 2013) for all variables. Table 3.3 shows the relationships between the predictor ($X_{1\text{-}8}$) variables and reported use of internally focused strategies (Y_1) before inclusion of the mediators; Table 3.4 presents the relationships between the predictor and

mediator variables. Table 3.5 displays the direct, indirect and mediation relationships between the predictors ($X_{1\text{-}8}$) and use of internally focused strategies (Y_1) through self-related (M^1) and other-related (M^2) motivation. The term 'mediator effect' implies a total effect between predictor and outcome was initially present, whereas 'indirect effect' does not (Hayes, 2013).

Table 3.2.
Means,. Standard Deviations, and Holms-Corrected Correlations for Key Variables

	Mean (*SD*)	Age	Sex	Pain Intensity	Pain Chronicity	Self-Related Motivation	Other-Related Motivation	Masculine Traits	Feminine Traits	Conformity to Masculine Norms	Conformity to Feminine Norms	Externally Focused Strategies	Internally Focused Strategies
Age	33.42 (*10.80)*		.073	.111	-.201**	-.030	-.044	.045	.003	-.143	.177*	-.091	-.131
Sex	N/A	.073		.111	-.057	-.146*	-.212**	-.104	.247**	-.447**	.328**	-.115	-.084
Pain Intensity	5.30 (*2.53*)	.111	.111		-.325**	.080	.012	.071	.117	-.026	.058	.074	.137
Pain Chronicity	1.61 (*0.49)*	-.201	-.057	-.325**		-.040	-.057	-.019	-.032	.007	-.095	-.024	-.079
Self-Related Motivation	1.78 (*0.95*)	-.030	-.146*	.080	-.040		.460**	.021	.018	.273**	-.017	.332**	.299**
Other-Related Motivation	0.89 (*1.04*)	-.044	-.212**	.012	-.057	.460**		-.093	-.103	.393**	-.041	.427**	.195**
Masculine Traits	2.40 (*0.63*)	.045	-.104	.071	-.019	.021	-.093		.300**	.090	-.073	.033	.190*
Feminine Traits	2.71 (*0.69*)	.003	.247**	.117	-.032	.018	-.103	.300**		-.351**	.259**	-.022	.141
Conformity to Masculine Norms	56.83 (*16.11*)	-.143	-.447**	-.026	.007	.273**	.393**	.090	-.351**		-.251**	.242**	.063
Conformity to Feminine Norms	73.17 (*13.16*)	.177*	.328**	.058	-.095	-.017	-.041	-.073	.259**	-.251**		.069	-.060
Externally Focused Strategies	2.30 (*0.83*)	-.091	-.115	.074	-.024	.332**	.427**	.033	-.022	.242**	.069		.356**
Internally Focused Strategies	3.12 (*0.93*)	-.131	-.084	.137	-.079	.299**	.195**	.190*	.141	.063	-.060	.356**	

** Correlation is significant at the 0.001 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 3.3

Effects of Predictor Variables (X_{1-8}) on Internally Focused Strategies (Y_1) and Externally Focused Strategies (Y_2)

Predictors		Outcomes					
		Y_1 (**Internally Focused Strategies**) Total Effect			Y_2 (**Externally Focused Strategies**) Total effects		
		Coeff.	SE	*p*	Coeff.	SE	*p*
X_1 (Age)		-.0128	.0041	.0015** CI= -.0206, -.0049	-.0067	.0035	.0579 CI= -.0137, .0002
X_2 (Pain Intensity)		.0433	.0173	.0127* CI= .0093, .0774	.0271	.0154	.0788 CI= -.0031, .0573
X_3 (Pain Chronicity)		-.1372	.0900	.1283 CI= -.3141, .0398	-.0072	.0800	.9284 CI= -.1643, .1499
X_4 (Sex)		-.1527	.0961	.1127 CI= -.3416, .0361	-.1056	.0853	.2167 CI= -.2733, .0621
X_5 (Masculine Traits)		.2001	.0708	.0049** CI= .0610, .3392	.0046	.0629	.9417 CI= -.1189, .1281
X_6 (Feminine Traits)		.1680	.0704	.0174* CI= -.0297, .3063	.0371	.0625	.5528 CI= -.0857, .1599
X_7 (Conformity to Feminine Norms)		-.0025	.0034	.4611 CI= -.0093, .0042	.0098	.0030	.0014** CI= .0038, .0158
X_8 (Conformity to Masculine Norms)		.0018	.0030	.5555 CI= -.0042, .0077	.0129	.0027	<.0001** CI= .0076, .0182
Constant	i_1	2.9204	.4702	<.0001** CI= 1.9963, 3.8444	i_2 .9925	.4176	.0179* CI= .1720, 1.8130
	R^2= .0954 $F(8, 469) = 6.18$, $p<.0001$				R^2= .0927 $F(8, 469) = 5.99$, $p<.0001$		

** Denotes significance at the 0.01 level (2-tailed).

* Denotes significance at the 0.05 level (2-tailed).

Table 3.4.

Effects of Predictor Variables (X_{1-8}) on Self-Related Motivation (M^1) and Other-Related Motivation (M^2)

Predictors		Outcomes						
		M^1 (Self-Related Motivation)				M^2 (Other-Related Motivation)		
		Coeff.	SE	*p*		Coeff.	SE	*p*
X_1 (Age)	a^1	.0004	.0041	.0969 CI= -.0076, .0084	a^2	-.0008	.0042	.8452 CI= -.0074, .0091
X_2 (Pain Intensity)	a^1	.0289	.0176	.1019 CI= -.0058, .0636	a^2	.0047	.0182	.7970 CI= -.0311, .0405
X_3 (Pain Chronicity)	a^1	-.0262	.0917	.7751 CI= -.2064, .1540	a^2	-.1162	.0948	.2210 CI= -.3025, .0701
X_4 (Sex)	a^1	-.1355	.0979	.1670 CI= -.3278, .0569	a^2	-.1824	.1012	.0721 CI= -.3813, .0164
X_5 (Masculine Traits)	a^1	-.0898	.0721	.2136 CI= -.2314, .0519	a^2	-.2753	.0745	.0002** CI= -.4218, -.1288
X_6 (Feminine Traits)	a^1	.1964	.0717	.0064** CI= .0556, .3372	a^2	.1499	.0741	.0437* CI= .0043, .2955
X_7 (Conformity to Feminine Norms)	a^1	.0026	.0035	.4536 CI= -.0042, .0095	a^2	.0037	.0036	.3114 CI= -.0034, .0108
X_8 (Conformity to Masculine Norms)	a^1	.0183	.0031	< .0001** CI= .0122, .0243	a^2	.0268	.0032	< .0001** CI= .0205, .0331
Constant	i_1	.3210	.4789	.5030 CI= -.6200, 1.2621	i_2	-.2310	.4952	.6410 CI= -1.2040, .7420
	R^2= .1021 $F(8,469) = 6.66$, $p<.0001$				R^2= .1885 $F(8,469) = 13.62$, $p<.0001$			

** Denotes significance at the 0.01 level (2-tailed).

* Denotes significance at the 0.05 level (2-tailed).

Figure 3.1 displays the significant direct and indirect predictors of use of internally focused strategies. Pain intensity, masculine traits, and feminine traits were significant, positive predictors of internally focused strategies, whilst age was a negative predictor. The nature of this relationship varied, in that some were direct, whereas others were indirect effects. Of the indirect effects, both types of motivation played a role in understanding this indirect relationship. Self-related motivation (b^1 = .2359, *SE* = .0470, p<.0001, CI: .1435, .3284), and other-related motivation were significant predictors of reported use of internally focused strategies (b^2 = .1074, *SE* = .0455, p= .0186, CI: .0180, .1968). Approximately 9% of the variance in reported use of internally focused strategies was accounted for by the predictors (R^2 = .0954). An additional 8% was explained upon the inclusion of the mediators (R^2 = .1784).

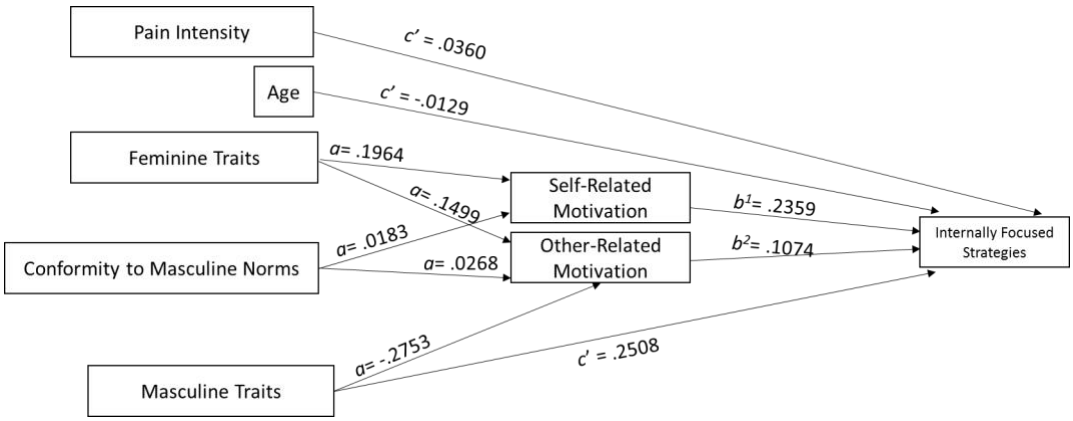

Figure 3.1. Significant predictors and paths of reported use of internally focused strategies.

Table 3.4 and Figure 3.1 show that participants reporting higher feminine traits (X_6) reported higher self-related motivation (a^1 = .1964) and other-related motivation to reduce pain (a^2 = .1499). The bias-corrected bootstrap confidence intervals (Table 3.5) were above zero for both self-related motivation (.0132 to .0948) and other-related motivation (.0004 to .0493), suggesting both types of motivation mediated the relationship between feminine traits and use of internally focused strategies. Pairwise comparisons between the two mediation effects (*b*= .0302, bootSE= .0219, bootCI= -.0063, .0800) were not significantly different. There was also no evidence that feminine traits influenced use of internally focused strategies independent of the effects on motivation (*c*' = .1055, *SE*= .0678, *p* = .1205, CI: -.0278, .2388), suggesting a full multiple mediation effect (Table 3.5).

Effects associated with conforming to masculine norms (X_8) were similar to those found for feminine traits. Participants who conformed highly to masculine norms reported

higher self-related motivation (a^1 = .0183) and other-related motivation (a^2 = .0268). When testing for indirect effects, the bias-corrected bootstrap confidence intervals were above zero for both self-related motivation (.0023 to .0071) and other-related motivation (.0004 to .0058). Pairwise comparisons suggested there was no significant difference between the two mediation effects (*b*= .0014, bootSE= .0019, bootCI= -.0021, .0054). Since conformity to masculine norms did not influence reported use of internally focused strategies independent of its effects on motivation (*c*' = -.0054, *SE*= .0031, *p* = .0851, CI: -.0115, .0008), this suggests a full indirect effect (Table 3.5).

Masculine traits (X_8) were related to internally focused strategies, but in a different way to that found for conformity to masculine norms and feminine traits. High identification with masculine traits was negatively related to other-related motivation (a^2 = -.2753), which served as a partial mediator of the effect on internally focused strategies, with bootstrap confidence intervals below zero (-.0667 to -.0056). No evidence of an indirect effect was found for self-related motivation. A direct effect between masculine traits and internally focused strategies remained (*c'* = .2508, *SE*= .0686, *p* = .0003, CI: .1161, .3856). This suggests that masculine traits directly affect reported use of internally focused strategies independent of their indirect effect on other-related motivation (see Table 3.5).

The mediation analyses also revealed that the negative effect of age on use of internally focused strategies was not mediated or indirectly affected (*c*' = -.0129, *SE*= .0038, *p* = .0007, CI= -.0204, -.0055), nor was the positive effect of pain intensity (*c*' = .0360, *SE*= .0166, *p* = .0306, CI: .0034, .0686); both have significant direct effects (Table 3.5). In addition to their non-significant total effects (Table 3.3), sex, conformity to feminine norms, and pain chronicity have no direct or indirect significant effects on use of internally focused strategies (Table 3.5).

Table 3.5.

Total Indirect, Specific Indirect, and Direct Effects on Internally Focused Strategies (IFS)

Predictors	Total Indirect Effect of X on IFS through M				Specific Indirect Effect of X on IFS through M_1 (SRM)				Specific Indirect Effect of X on IFS through M_2 (ORM)				Direct Effect of X on IFS controlling for M (c')			
	Coeff.	bootSE	bootLLCI	bootULCI	Coeff.	bootSE	bootLLCI	bootULCI	Coeff.	bootSE	bootLLCI	bootULCI	Coeff.	SE	*p*	CI
X_1 (Age)	.0002	.0013	-.0024	.0029	.0001	.0011	-.0020	.0024	.0001	.0005	-.0008	.0013	-.0129	.0038	.0007**	-.0204, -.0055
X_2 (Pain Intensity)	.0073	.0055	-.0024	.0194	.0068	.0044	-.0004	.0169	.0005	.0022	-.0033	.0058	.0360	.0166	.0306*	.0034, .0686
X_3 (Pain Chronicity)	-.0187	.0295	-.0811	.0363	-.0062	.0228	-.0548	.0375	-.0125	.0128	-.0479	.0047	-.1185	.0861	.1696	-.2878, .0508
X_4 (Sex)	-.0516	.0324	-.1232	.0047	-.0320	.0246	-.0873	.0108	-.0196	.0148	-.0613	.0007	-.1012	.0922	.2728	-.2823, .0799
X_5 (Masculine Traits)	-.0508	.0262	-.1085	-.0042	-.0212	.0181	-.0607	-.0114	-.0296*	.0155	-.0667	-.0056	.2508	.0686	.0003**	.1161, .3856
X_6 (Feminine Traits)	.0624*	.0252	.0202	.1218	.0463*	.0205	.0132	.0948	.0161*	.0117	.0004	.0493	.1055	.0678	.1205	-.0278, .2388
X_7 (CFNI-45)	.0010	.0011	-.0010	.0036	.0006	.0009	-.0011	.0026	.0004	.0005	-.0003	.0017	-.0035	.0033	.2808	-.0100, .0029
X_8 (CMNI-46)	.0072*	.0018	.0040	.0111	.0043*	.0012	.0023	.0071	.0029*	.0014	.0004	.0058	-.0054	.0031	.0851	-.0115, .0008

** Denotes significance at the 0.01 level (2-tailed).

* Denotes significance at the 0.05 level (2-tailed).

Predictors of Externally Focused Strategies

Means, standard deviations and Holm-Bonferroni corrected correlations (Gaetano, 2013) correlations are in Table 3.2. Table 3.3 presents the relationships between the predictors ($X_{1\text{-}8}$) and reported use of externally focused strategies (Y_2) prior to the inclusion of mediators; as before, refer to Table 3.4 for the relationships between the predictor and mediator variables.

Figure 3.2 shows the significant direct and indirect predictors of use of externally focused strategies. The same core predictor variables as reported above for internally focused strategies were found for externally focused strategies. In addition, conformity to feminine norms had a role, whereas pain intensity did not. As before, both types of motivation had indirect, mediating roles; both self-related motivation (b^1= .1306, *SE* = .0402, *p*= .0012) and other-related motivation (b^2= .2646, *SE* = .0389, *p*<.0001) predicted use of externally focused strategies (Y_2). Approximately 9% of the variance in use of externally focused strategies was accounted for by the predictors alone (R^2 = .0927), with an additional 15% of the variance explained following the inclusion of the mediators (R^2 = .2357).

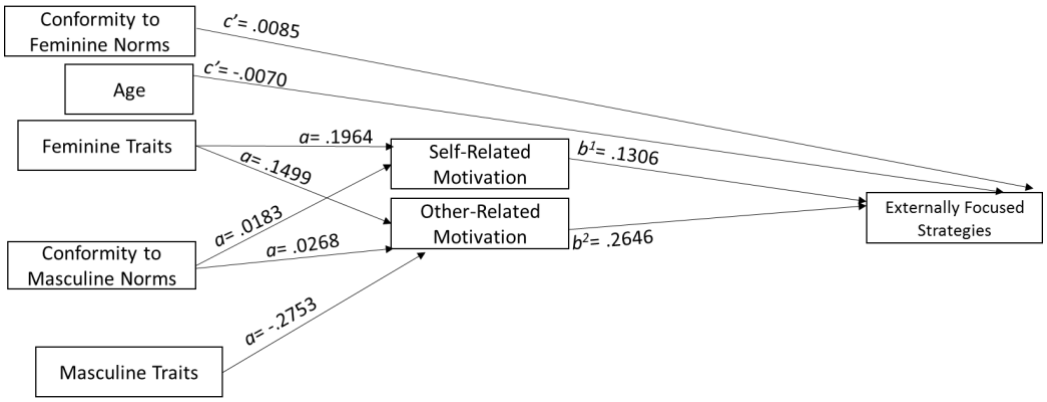

Figure 3.2. Significant predictors and paths of reported use of externally focused strategies.

Table 3.6 and Figure 3.2 show that the key differences between the internal and externally focused strategies models relate to effects associated with masculine traits (X_5) and conformity to feminine norms (X_7). For masculine traits, the indirect relationship was still present. Participants high in masculine traits reported lower other-related motivation (a^2 = -.2753). When testing for indirect effects between masculine traits and reported use of externally focused strategies, bias-corrected bootstrap confidence intervals for other-related motivation were below zero (-.1269 to -.0335), suggesting a negative indirect effect. There

was no evidence that masculine traits influenced use of externally focused strategies (*c*' = .0892, *SE*= .0586, *p* = .1291, CI: -.0261, .2044), suggesting a complete indirect effect (Table 3.6).

In terms of feminine traits (X_6) and conformity to masculine norms (X_8), a similar (but not identical) pattern was found. When testing for indirect effects for feminine traits, confidence intervals were above zero for both self-related (.0071 to .0571) and for other-related (.0013 to .0909) motivation. The indirect effects were positive, and did not statistically differ (*b*= -.0140, bootSE= .0211, bootLLCI= -.0597, bootULCI= .0248). There was no evidence that feminine traits had a direct effect on use of externally focused strategies (*c*' = -.0282, *SE*= .0580, *p* = .6272, CI: -.1422, .0858), suggesting a full indirect effect (Table 3.6). Similarly, for conformity to masculine norms, the bias-corrected bootstrap confidence intervals were above zero for both self-related (.0010 to .0043) and other-related (.0043 to .0106) motivation. Unlike for internally focused strategies, post-hoc contrasts revealed that the indirect effects of motivation differed; the effect of other-related motives was significantly greater than that found for self-related motives (*b*= -.0047, bootSE= .0017, bootLLCI= -.0082, bootULCI= -.001). There was no evidence that conforming to masculine norms influenced use of externally focused strategies independent of its effect on motivation (*c*' = .0035, *SE*= .0027, *p* = .1967, CI: -.0018, .0087), suggesting motivation to relieve pain fully mediates this relationship.

An additional difference between externally focused and internally focused strategies relates to effects associated with conformity to feminine norms. Conformity to feminine norms had a total, direct, and unmediated positive effect on use of externally focused strategies (*c*'= .0085, *SE*= .0028, *p* = .0027, CI: .0029, .0140). There was also a direct effect of age on externally focused strategies, but no evidence of any mediating or indirect effects (*c*' = -.0070, *SE*= .0033, *p* = .0321, CI: -.0134, -.0006). In addition to the non-significant total effects (see Table 3.3), sex, pain intensity, and pain chronicity had no direct or indirect significant effects on reported use of externally focused strategies (Table 3.6).

Table 3.6.

Total Indirect, Specific Indirect, and Direct Effects on Externally Focused Strategies (EFS)

Predictors	Total Indirect Effect of X on EFS through *M*				Specific Indirect Effect of X on EFS through M^1 (SRM)				Specific Indirect Effect of X on EFS through M^2 (ORM)				Direct Effect of X on EFS controlling for M (c')			
	Coeff.	bootSE	bootLLCI	bootULCI	Coeff.	bootSE	bootLLCI	bootULCI	Coeff.	bootSE	bootLLCI	bootULCI	Coeff.	SE	*p*	CI
X_1 (Age)	.0003	.0015	-.0026	.0032	.0001	.0006	-.0011	.0014	-.0002	.0011	-.0020	.0025	-.0070	.0033	.0321*	-.0134, -.0006
X_2 (Pain Intensity)	.0050	.0061	-.0071	.0175	.0038	.0026	-.0002	.0103	.0012	.0049	-.0083	.0112	.0221	.0142	.1205	-.0058, .0500
X_3 (Pain Chronicity)	-.0342	.0346	-.1118	.0261	-.0034	.0130	-.0306	.0222	-.0307	.0269	-.0906	.0160	.0270	.0737	.7144	-.1178, .1717
X_4 (Sex)	-.0660	.0376	-.1471	.0021	-.0177	.0143	-.0527	.0051	-.0483	.0299	-.1155	.0043	-.0396	.0788	.6154	-.1945, .1153
X_5 (Masculine Traits)	-.0846*	.0290	-.1501	-.0340	-.0117	.0109	-.0381	-.0057	-.0728*	.0233	-.1269	-.0335	.0892	.0586	.1291	-.0261, .2044
X_6 (Feminine Traits)	.0653*	.0295	.0151	.1331	.0257*	.0124	.0071	.0571	.0397*	.0224	.0013	.0909	-.0282	.0580	.6272	-.1422, .0858
X_7 (CFNI-45)	.0013	.0013	-.0010	.0039	.0003	.0006	-.0006	.0017	.0010	.0010	-.0009	.0032	.0085	.0028	.0027**	.0029, .0140
X_8 (CMNI-46)	.0095*	.0019	.0061	.0137	.0024*	.0008	.0010	.0043	.0071*	.0016	.0043	.0106	.0035	.0027	.1967	-.0018, .0087

** Denotes significance at the 0.01 level (2-tailed).

* Denotes significance at the 0.05 level (2-tailed).

Discussion

When examining sex and gender together, sex did not emerge as a significant predictor of use of pain relief, whereas gender-related factors did. This suggests that gender constructs, rather than sex, may be more important when considering the use of pain coping strategies, as is being discovered across health research in which behaviour is a focus (Lyons, 2009). This is of interest considering the proclivity of previous research to study differences in coping with pain based on categorical sex, which may not be the best predictor. We were interested in two aspects of gender: identification with gendered traits and conformity to gender norms. Both were included due to their presence in the pain literature (Abetkoff, Karlsson, & Chiou, 2015; Alabas, Tashani, Tabasam, & Johnson, 2012), causing us to want to explore the roles of both in the present study, although there were no a priori hypotheses. Both were relevant to pain management behaviours, although their roles depended on the type of pain relief considered, demonstrating the value of taking a more exploratory approach when extant literature is lacking. The more an individual identified with masculine traits, the more frequently they reported using internally focused strategies. Use of externally focused strategies was related to behaving in typically feminine ways, suggesting that these strategies are more aligned with feminine gender norms, and that 'demonstrating' pain in this way could be considered a feminine practice (Courtenay, 2000). This suggests that different manifestations of gender are related to coping in different ways, with personal attributes such as gendered traits being related the use of internal, cognitive-emotional strategies, whilst broader behavioural patterns such as gender norm conformity predict performance of external, often observable strategies.

We tested whether motivation to relieve pain may help to explain the relationships between sex and gender factors and use of pain relief. No such effect was found for sex. However, both self- and other-related motivation mediated the effects of gender factors on use of both internally and externally focused strategies. This suggests that the favoured approach to pain management may be driven by both one's own beliefs and values and the perceived expectations of others. This supports Pool and Schwegler (2007)'s multiple motives for norm conformity, and the closely related multiple motivations for health behaviours outlined in Self-Determination Theory (Deci & Ryan, 2008a). These results support the idea that the choices we make when in pain may be influenced by different, sometimes conflicting, motivations and, presumably, goals (Van Damme, Crombez, & Eccleston, 2008). That said, the effect of conforming to masculine norms on the use of externally focused strategies was stronger through other-related than self-related motivation.

Although speculative, it is possible that because pain expression and help-seeking are more direct violations of masculine norms than feminine norms (Addis & Mahalik, 2003; Robinson et al., 2001; Wandner, Scipio, Hirsh, Torres, & Robinson, 2012), concern regarding the judgements of others when choosing more overt pain relief is more closely related to this masculine construct. Further research is required to confirm the extent to which gender influences motivation in a way that generates barriers to seeking pain relief.

There are limitations to the current study to note. First, our sample was relatively young, and largely British. Our findings should be understood in this context. Gender is considered fluid, both historically and culturally, and we might expect different patterns of results with different samples. Second, we introduced a novel scale of pain relief motivation and an inventory of common pain relief strategies. Again, we make no claim to their universal validity and recognize their specific relevance. We strongly advocate that future research explore the relationships between these constructs further. In particular, we recommend replication, extension, and adaptation in different settings and samples to validate these measures and their associated constructs. Third, this study is cross-sectional and we are unable to say anything about the antecedents or consequences of behaviour.

There are, however, potential implications for practice that could be explored. When we seek to explain how and why people might respond to pain, and how they use different strategies to try to relieve pain, gender should be considered alongside sex. Second, given the fluidity of gender and how it is expressed, it is important to understand the social and motivational context of gendered action. It would be interesting to examine how gender identification influences pain management decisions in practice, from the everyday practices of seeking advice or consumer medication use, to health-care practitioner delivered pain management in emergency, medical or surgical environments. Accounting for gendered coping preferences or gender norm concordance is rare in the clinical research literature on pain management, although we suspect not pain management practice itself. Finally, assumptions about gender-relevant pain behaviours are typically only apparent when violated; when one acts outside of expected social norms. Understanding how gender norm violations are managed in healthcare contexts will help in understanding the diversity of pain responding.

We provide evidence that when asked which strategies people have recently used to reduce or remove their pain, responses are discriminated more by gender than by sex. Understanding how gender, and one's motivation to follow one's own valued goals or to

conform with the judgements of others, can influence important health decisions, such as what to do when in pain.

Chapter Four: Pain relief norms and stereotypes for men and women

Primary paper
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Statement from candidate	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature.								
Signed				**Date**		12/03/2019			

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Background

The aim of the previous chapter was to study how sex and gender factors were related to use of different types of pain relief, and whether motivation mediated these relationships. I found that masculine traits were positively related to more frequent use of internally-focused pain relief strategies, and conformity to feminine norms to use of externally-focused pain relief strategies. These findings support and extend the outcomes of the literature review in Chapter 1. Considering gender as well as sex in the previous chapter has advanced our understanding of how men and women seek to relieve pain. For example, the relationship between masculine traits and internally-focused pain relief supports the idea that men cope more internally than women do (Astor-Dubin & Hammen, 1984), but suggests that it is not *being* categorically male, but having masculine traits that is associated with this form of coping. Moreover, as internally-focused pain relief included 'ignoring the pain', the results support the idea that the typical man is more likely to ignore pain than the typical woman (Keogh & Denford, 2009), but again that ignoring pain is associated with masculine traits rather than being male.

The externally-focused pain relief subscale, which was positively related to conformity to feminine norms, included acupuncture, ask a healthcare professional for advice, ask friends for advice, ask family for advice, take a painkiller, and pray. As such, my results support the idea that women use more somatic treatments (Grossi et al., 2000), take more painkillers (Bassols et al., 1999; Grossi et al., 2000; Isacson & Bingefors, 2002; Vowles et al., 2014; Wijnhoven et al., 2007), use more medical care (Wijnhoven et al., 2007), social support (Keogh & Eccleston, 2006; Rovner et al., 2017; Unruh et al., 1999), and spiritual comfort/prayer (Affleck et al., 1999; Edwards et al., 2004; Keogh & Denford, 2009) than men do. However, once again it seems that it is not *being female* which predicts this, but behaving in typically feminine ways by conforming to feminine norms.

My results do present a potential conflict with previous research in the sense that relaxation was included in the internally-focused subscale which was associated with masculine traits, conflicting with Affleck et al. (1999)'s finding that women used relaxation more than men. This is why considering gender is important, as it could be that the women in Affleck et al.'s study were high in masculine traits. Similarly, my results could help to explain the contradictory findings concerning distraction, which was included in the internally-focused subscale. Whilst Unruh et al. (1999) found that men were more likely to

use distraction, Affleck et al. (1999) found that women were. It could be that the participants in both studies had masculine traits, and that it is these traits which are related to more internally-focused forms of pain relief such as distraction. However, this does not explain why participants in Keogh and Denford (2009)'s study believed the typical woman was more likely to distract herself from pain than the typical man.

Taken together, the results reported in the previous chapter generally support previous research but suggest that previously observed differences between men and women may be the result of gendered traits and behaviours rather than being male or female per se. Similarly, it is possible that the contradictions in the coping literature are the result of not taking a gendered approach, and therefore neglecting some of the similarities between the sexes. The results also shed light on the relationships between gender and relatively unstudied forms of pain relief, such as use of medical devices such as TENS machines, herbal remedies, hot treatments, cold treatments, topical treatments, venting anger, and going to bed, all of which loaded onto the externally-focused subscale which was related to conformity to feminine norms.

Generally, the findings reported in Chapter 3 can be speculatively interpreted in relation to broader gender stereotypes. However, the general relationships between the two categories of pain relief and gender factors raised the question of whether individual pain relief strategies are seen as gendered, and whether this influences people's expectations of how men and women should seek to relieve their pain. These questions formed the aim of this chapter: to explore perceptions of norms and stereotypes in relation to men and women's use of pain relief. Answers to these questions will contribute towards the overall thesis aim of advancing our understanding of how sex and gender are related to use of pain relief.

Perceptions of stereotypes are formed, in part, based on one's own understanding and experiences. As such, there are a variety of ways in which stereotypes can be constructed, making it entirely possible for competing stereotypes to emerge and change over time (Stangor, 2000). Consequently, Q-methodology was selected as a means of allowing participants to reflect on the social acceptability of different forms of pain relief for men and women in 21st Century Britain. Traditionally, Q-methodology values and captures participants' subjective viewpoints surrounding a particular topic or issue by asking participants to rank statements relating to the subject matter in terms of personal (dis)agreement (Watts & Stenner, 2005). As my aim was for participants to reflect on the broader social acceptability of a range of pain relief strategies, I utilised Q-methodology in a rather novel and innovative way; for the construction of perceptions of broader social

phenomena as opposed to personal viewpoints. Semi-structured interviews were also conducted to gain a deeper understanding of *why* participants held these perceptions; the analysis and results of these data are reported in Chapter 5.

"Exploring perceptions of gendered and ungendered pain relief norms and stereotypes using Q-methodology"

Abstract

Pain is ubiquitous, but effective pain relief eludes many. Research has shown that some pain behaviours are perceived as gendered, and this may influence the way men and women express and cope with pain, but such enquiries have not extended to specific methods of pain relief. Our aim was to explore perceptions of the most socially acceptable ways for men and women to relieve pain. Across two studies, sixty participants (50% male) aged 18-78 completed a Q-sort task, sorting different pain relief strategies by the social acceptability for either women (Study 1; N=30) or men (Study 2; N=30). Analyses revealed two stereotypes for each sex. The overarching stereotype for women suggested it is most acceptable for them to use pain relief strategies considered conventional and effective. However, a second stereotype suggested it is most acceptable for women to use strategies which generally conform to feminine gender norms and stereotypes. The overarching male stereotype suggested it is most acceptable for men to use pain relief aligned with stereotypical masculinity, however a second stereotype also emerged, characterised by conventional and effective responses to pain, much like the overarching stereotype for women. These differing viewpoints seem to depend on whether gender norm conformity or perceived analgesic efficacy is thought to determine social acceptability. These studies provide initial evidence of both a gendered and ungendered lens through which pain relief can be viewed, which may influence how men and women use pain relief.

Keywords: sex; gender; pain relief; q-methodology; masculinity; femininity; pain management; gender stereotypes

Introduction

Women report more pain than men: more frequently, in more bodily locations, and of longer duration [3; 33]. Evidence also suggests that men and women cope with pain in different ways. Women are more likely to use positive self-talk [54], and seek greater social [46; 54] and professional support [58]. Women are also more likely to use pain medication [56] and less likely to self-medicate with alcohol [42]. These differences may be explained by gender norms guiding men and women's behaviours [24]. Behaviours become gendered based on gender ideologies, reflecting the traits, attributes, and behaviours, which characterise the 'ideal man' or 'ideal woman' at a given time in society [44]. These ideals produce gender norms; expectations of how men and women should behave within a given context, including pain.

In Western societies, masculinity is typically characterised by strength, stoicism, self-reliance, and independence, and femininity by being emotionally expressive, nurturing, and domestic [50]. Therefore, masculinity may pose more obvious barriers to help-seeking. Indeed, research suggests that men are more likely to explicitly identify barriers to seeking help posed by stereotypical masculinity, but both sexes recognise that men are expected to express strength and stoicism, and that if men do seek help it could be judged as a sign of weakness [30]. Both sexes seem to believe that expressing pain is more acceptable and appropriate for women than men across a range of cultures [21; 36] and occupations [29]. Similarly, both men and women believe women are more sensitive to pain, less able to endure pain, and more willing to report pain than men [45]. These expectations can differentially guide men and women's behaviours [24]. Taken together, these studies suggest that the expression of pain and how one responds to pain are part of a wider gendered discourse of stereotypically masculine and feminine norms.

Gendered discourse extends to ways of coping with pain. For example, one study reports that people view the typical man as being more likely to ignore pain and use coping self-statements, whilst the typical woman is thought to pray and use distraction [27]. In their review of gender biases in clinical setting, Samulowitz and colleagues [47] noted that gender norms affect the way in which men and women in pain are perceived, and treatment decisions. For example, a study of healthcare decisions found some professionals were more likely to suggest analgesics for men, and psychological treatment for women [48].

Despite the aforementioned research, little is known about how ways of *relieving* pain may be perceived as gendered, and whether this influences how men and women seek pain relief. Use of pain relief is crucial in determining the impact that pain can have on one's life, so it is necessary to understand which factors, including gender norms, determine the social acceptability of men and women's use of pain relief. We explored this in two studies; study one explored men and women's perceptions of socially (un)acceptable pain relief strategies for women, and study two explored these perceptions for men.

Method

Q-Methodology

Q-methodology was chosen because it values and captures participants' subjective and diverse understandings or viewpoints surrounding a particular topic or issue [6], using an inversion of traditional R factor analysis [57]. Traditionally, participants order statements relating to the subject matter in terms of personal (dis)agreement [2; 16; 32; 43]. However, our aim was for participants to reflect on the broader social acceptability of a range of pain relief strategies. As such, we utilised Q-methodology in a novel and innovative way; to explore perceptions of broader social phenomena as opposed to personal attitudes and beliefs.

Previous research has typically used questionnaires to assess perceptions of the typical man and typical woman's pain sensitivity, endurance, and willingness to report pain [45]. Whilst we wanted to extend these enquires to pain relief, we also sought to capture a more nuanced understanding of the factors influencing the social acceptability of men and women using different methods of pain relief. This included exploring how different ways of relieving pain might be ranked in relation to one another. As such, these studies extend previous quantitative investigations, but take a slightly different, mixed-methods Q-methodological approach.

In Q-methodology, participants complete a task known as the 'Q-sort task'. During the Q-sort task, participants rank a 'Q-set' onto a 'Q-sort grid' in response to an instruction. The Q-set is a list of items which can be ranked from the participant's first-person perspective, and can therefore include statements, objects, traits, amongst many other varied possibilities [57]. The Q-sort grid onto which the items are ranked is often referred to as the 'sorting distribution' in the shape of a normal distribution curve, with the most options

available in the centre column and the least at the extreme ends of the grid [8]. The end result is each participants' own 'Q-sort' which reflects the viewpoint they have constructed and conveyed.

Q-methodology is a method of subjectivity, and as such reliability and validity are assessed in different ways to traditional quantitative methods. A Q-sort is considered a valid expression of the participant's point of view, and as such cannot be appraised using external criteria [7]. Evidence shows that Q-methodology has good test-retest reliability [14], as well as reliability and stability when different samples are used [52]. Despite this evidence, generalisability is not intended to occur beyond the original participants; the value of Q-methodology is in its ability to capture valid and authentic opinions on a topic. Once captured, subsequent investigations can use standard variance analyses to test their prevalence within larger populations [55].

Phase 1: Generating the Q-set

The first phase was to develop the 'Q-set' items; a range of pain relief strategies to be ordered based on participants' perceived social acceptability for a man or a woman. The same Q-set was used in Studies 1 and 2, but ranked according to different instructions. A thorough online and offline search was conducted to produce a list of pain relief strategies, including both evidence-based and folk remedies, by searching through journal articles, blog posts, online forms, news articles, and discussing with colleagues. This search included reviewing the pain coping literature. Although the pain coping literature often focuses on ways of tolerating or enduring chronic pain, rather than removing it, measures include items that could have analgesic properties [41; 44] and were also included. From this, we compiled over 100 ways of relieving pain, reduced to 77 by removing repetition, merging similar strategies, and modifying wording for maximum intelligibility and appropriateness. The Q-sort task was piloted with ten volunteers (5 male, 5 female). Following their feedback, the final Q-set was condensed to 62 ways of relieving pain. The 62 strategies were randomly numbered from 1 to 62 and printed to fit a 13-point Q-sort grid. The anchors of the Q-sort grid ranged from 'completely unacceptable' to 'completely acceptable'.

The instruction for Study 1 was:

> "In this society, if a woman is in pain, how acceptable is it for her to use this behaviour to relieve her pain?"

The instruction for Study 2 was:

"In this society, if a man is in pain, how acceptable is it for him to use this behaviour to relieve his pain?"

Phase 2: Conducting the Q-sort Task

Sampling for Q studies involves recruiting participants who are likely to hold different viewpoints and perspectives on the subject matter [57]. Although almost all individuals have a viewpoint they can reflect on in relation to this topic, it was difficult to know how to identify those with different viewpoints, so we sampled for maximum variation, recruiting 60 participants; 30 for each study. Thirty participants was deemed an acceptable sample size based on the guidance of Watts and Stenner [57], who recommend sample size should be no greater than half the size of the Q-set ($N = 62$). Both men and women were recruited for each study to gain both same-sex and opposite-sex perceptions. The study was advertised on social media and posters were displayed on University and community noticeboards.

Institutional approval was granted by the relevant University ethics committees. All participants completed the study at the University of Bath in the United Kingdom. After informed consent procedures and a demographics questionnaire, the Q-sort task was conducted following the steps recommended by Watts and Stenner [57]. First, participants were asked to sort the Q-set cards into three piles; acceptable, unacceptable, and undecided/neutral in response to their instruction. Participants were then asked to focus on the 'unacceptable' pile, and pick the two strategies considered the least socially acceptable for either a man or a woman–depending on which instruction they were following– and place them on the sorting grid. They then selected the next three least acceptable, and so on, until all of the 'unacceptable' items had been ranked onto the grid. The process was then repeated for the 'acceptable' items, and finally the 'undecided/neutral' items. The position of each pain relief strategy was coded based on its placement, with the two items at the 'completely unacceptable' end coded as -6, through to the two at the 'completely acceptable' end coded as +6.

Semi-structured interviews were also conducted with one third of participants to gain a richer and more detailed understanding of the Q-sort. Participants were asked why they had

ranked the pain relief strategies in the way they had, particularly the most acceptable and least acceptable strategies. Questions included "You chose X as the most acceptable strategy for a (wo)man. Why is that? Why did you rank it so strongly?" and "Would it be any different for a (wo)man?" The interview data were collected in order to be thematically analysed and reported separately, but relevant verbatim quotations from the interviews are used to support the results presented here. Participants who completed the Q-sort were reimbursed £5 for their time, and participants who also completed the interview were reimbursed an additional £5.

Phase 3: Analysing and Interpreting the Q-Sorts

The aim of the analysis was to extract different viewpoints and identify the groups sharing these viewpoints. To do so, a mixed-methods approach is required, beginning with a quantitative analysis to extract the viewpoints, followed by qualitative analysis to interpret the viewpoints. To quantitatively extract the different viewpoints centroid factor analyses with Varimax rotation were conducted using PQMethod [49]. Initially, seven factors were extracted in accordance with Brown's criteria for analysing Q-sorts [6]. The number of factors to then rotate was determined by the Kaiser-Guttman criterion of eigenvalues above 1 [20; 25], as well as Brown's criterion of retaining factors with at least two significant factor loadings, but not including confounding sorts which significantly load onto more than one factor [6].

Factor arrays (see Figures 4.1-4.4) were then created using the Z-scores for each defining participant to produce a single Q-sort to represent the viewpoint of each factor. As these viewpoints represent beliefs about the characteristics of a specific social group [51], the terms 'stereotype' and 'factor' are used interchangeably to refer to the meaning conveyed in the factor arrays. The term 'norm' is used to refer to the specific placement of a strategy on a factor array, i.e. the strategies ranked as the most acceptable in each factor array can be interpreted as a norm within that viewpoint/stereotype. These represent injunctive norms (what one is expected to do in a given situation) rather than descriptive norms (what most people do in a given situation) [51].

Qualitative interpretation of the factor arrays involved considering the relevance and meaning of the most and least acceptable strategies as ranked on the Q-sort grid, and the distinguishing and consensus items revealing which strategies did and did not significantly

differ across factors respectively. The interview data of participants whose Q-sorts defined the factor were also used to aid interpretation. The specific quotations selected are those which best represent the reasons given for the rankings by participants who defined each factor. As will be seen, at times participants referred to their own pain experiences and the experiences of the men and women in their lives as guiding their completion of the Q-sort task. Other times, participants' explanations referred specifically to existing knowledge of broader masculine and feminine stereotypes and sex differences in pain behaviours. As such, this knowledge was used to aid interpretation when appropriate.

Results

Study 1: Norms and stereotypes for women

Ten students (5 female, 5 male), 5 members of University staff (3 female, 2 male), and 15 members of the general community (8 female, 7 male) completed the Q-sort task following the instruction: "In this society, if a woman is in pain, how acceptable is it for her to use this behaviour to relieve her pain?". The median age of all participants was 29 years (*M*= 33.77 years; *SD*= 12.88; range 18-66). Student ages ranged from 20 to 32, with a mean age of 25.80 (*SD = 3.99)*, staff ages ranged from 24 to 45 (*M* = 35.00, *SD* = 9.57), and community members were aged 18 to 61 (*M* = 38.67, *SD* = 15.34). Six participants reported that they were currently in pain (all female; 1 student, 2 staff, 3 general community), and five participants reported chronic pain (all female; 3 students, 2 general community). All participants were heterosexual, the majority were single (37%), lived in shared housing (23%), were White (93%), native English speakers (87%), born in the UK (87%), and held a Master's degree as their highest qualification (50%).

Following the quantitative analytic process outlined above, three factors had eigenvalues above 1 (14.37, 2.09, 2.01), suggesting three common viewpoints across the 30 participants. However, the defining sorts of the third factor all significantly loaded onto another factor, thus violating Brown's criteria [6]. The analysis was repeated, this time requesting and rotating two factors, which confirmed that the maximum solution supported by the data consisted of two factors, each of which were defined by at least two non-confounding Q-sorts. Despite rejecting confounding factors and factor loadings, the correlation between the two factors was 0.45, suggesting they may be alternative manifestations of a similar viewpoint (stereotype). The two-factor solution explains 55% of the variance and accounts for 12 of the 30 Q-sorts. Participant comments and existing

theories and research are used to interpret each of the factor arrays to understand and contextualise their meaning.

Stereotype 1: Normative and effective pain relief for women (Figure 4.1)

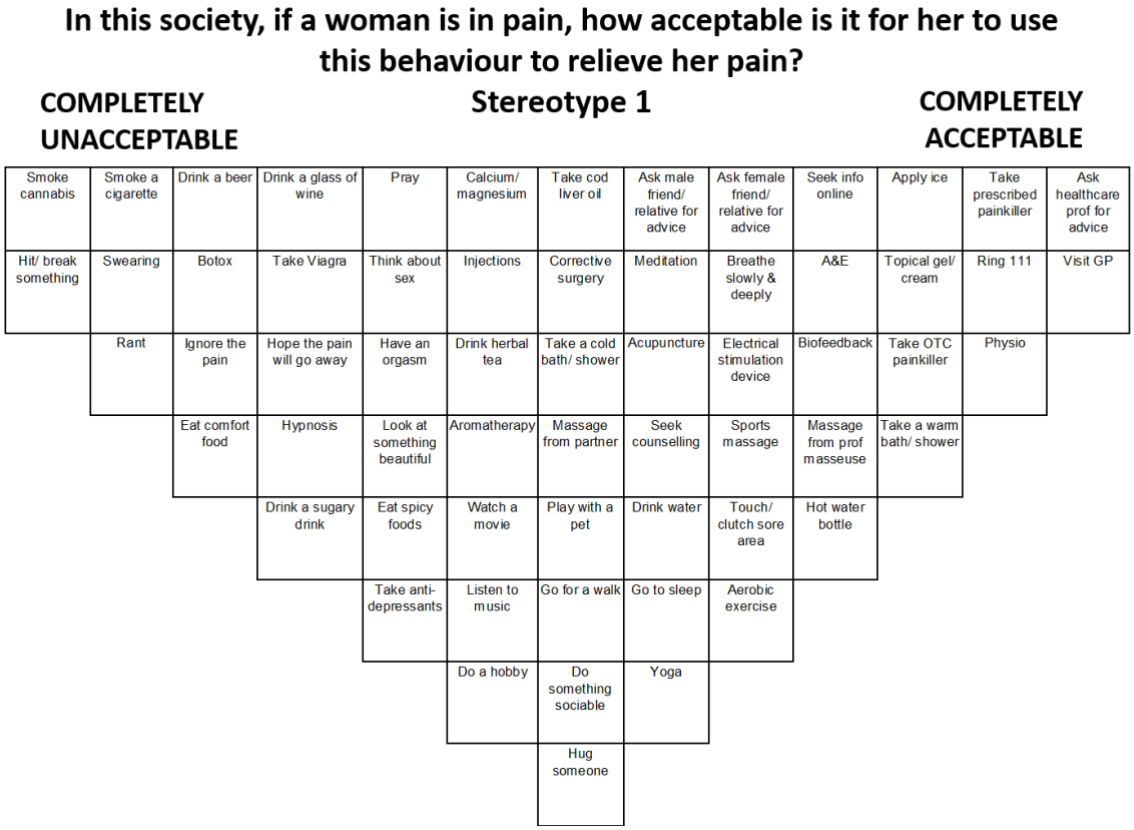

Figure 4.1. Factor array for female stereotype 1 (Normative and effective pain relief for women)

This factor explained 48% of the variance in the Q-sorts in this study, and is defined by 7 Q-sorts (5 male, 2 female). This factor suggests that it is socially acceptable for a woman to use strategies perceived to be conventional, effective attempts to relieve pain based on common-sense judgements. Of importance is that this viewpoint is not based on evidence of the efficacy of the strategies, but the *perception* that they are effective, which should not be conflated. However, this factor is labelled 'normative and effective pain relief for women' as these are the factors which participants refer to in making their judgements, and so this label best reflects their viewpoints. The most acceptable strategies seem to be traditional, biomedical strategies which tackle the source of the pain, for example utilising healthcare services such as 'visit GP' (+6), 'ask a healthcare professional for advice' (+6), 'ring 111' (+5), 'physiotherapy' (+5) and 'take prescribed painkiller' (+5). The extent to which these are considered normative responses to pain is highlighted:

> *"It's, kind of what everybody seems to do, when they do it, when they have a problem with pain."* [Male 1]

The way the items in this factor were positioned suggests it is less acceptable to use pain relief strategies that are uncommon or considered ineffective. Many of the neutral items were everyday behaviours, not designed to directly target the pain, for example 'play with a pet' (0) and 'go for a walk' (0). Participant comments suggest there is some recognition that they could have a positive psychological effect, one might risk social disapproval for not taking pain seriously:

> *"Playing with a pet, or doing a hobby, erm I think that's sort of, just a bit more… it's not seen as it's really like taking the pain seriously and not doing enough compared to taking medication and stuff, and I feel like even though it might actually may help… um, if you told someone you were in pain and you were just, you know, doing something sociable, or doing a hobby to sort of try and help that, that wouldn't be seen as dealing with pain correctly."* [Female 1]

The composition of this factor also suggests it is unacceptable for women to use strategies considered not only ineffective, but also likely to cause further harm, such as 'hit/break something' (-6) or 'smoke a cigarette' (-5). Whilst these harmful behaviours could be interpreted by some as having masculine connotations, they were ranked based on their perceived inability to relieve pain:

> *"It's not really very useful, and might sort of, relieve a bit of frustration for a while, but that's about all."* [Male 1]

The exception to this interpretation is 'smoking cannabis', which was ranked at -6. Although the use of cannabis for pain relief is contentious [37], this evidence is overridden by the illegality of the behaviour, ultimately rendering it unacceptable for women:

> *"The only thing that's on there that is currently illegal, I think, is smoking cannabis, so, the social acceptability amongst many people is, um, is constrained by the illegality."* [Male 1]

This factor suggests that there are relatively ungendered pain relief norms; clear, unwritten rules and a commonly shared perception of what will and will not relieve pain. Participant comments suggest there are social perceptions of 'correct' and 'incorrect' ways of managing pain and that women should behave accordingly. Everyday behaviours not typically perceived as effective pain relievers were considered neither acceptable nor

unacceptable, whereas potentially harmful and illegal behaviours were considered the least acceptable options for a woman in pain.

Stereotype 2: Conformity to traditional feminine norms (Figure 4.2)

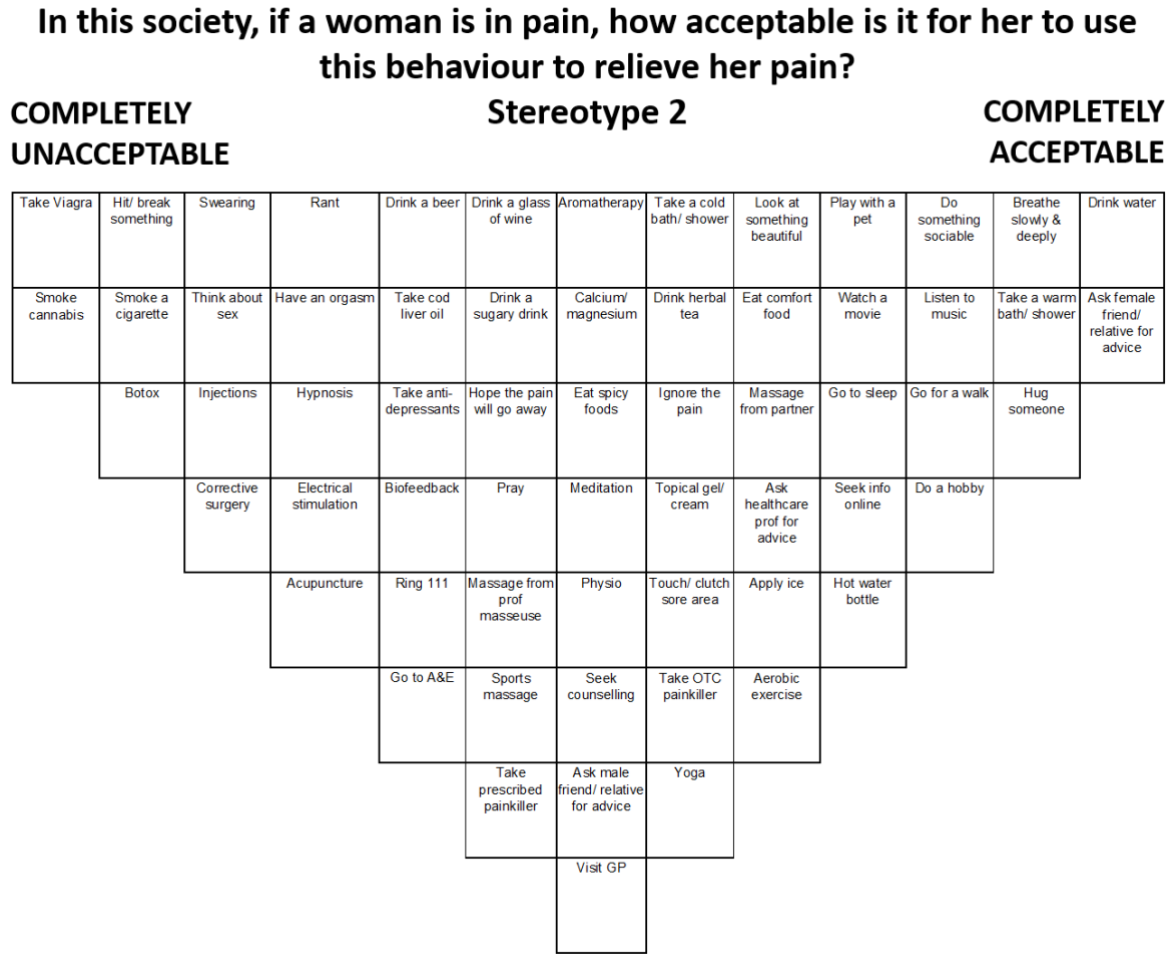

Figure 4.2. Factor array for female stereotype 2 (Conformity to traditional feminine norms)

This factor explained 7% of the variance in the Q-sorts in this study, and is defined by 5 Q-sorts (4 female, 1 male). This second stereotype for women advocates everyday behaviours (e.g. 'drinking water' +6; 'breathing slowly and deeply' +5, 'taking a warm bath or shower' +5), as well as typically feminine behaviours (e.g. 'asking a female friend or relative for advice' +6; 'hug someone' +5). These behaviours can be categorised as 'feminine' based on existing theories and research suggesting women are traditionally viewed as sociable and nurturing [28; 50]. This factor is more ambiguous than the previous factor, however, as the everyday behaviours ranked as acceptable, such as drinking water and breathing slowly and deeply, would not necessarily be considered traditionally 'feminine'. However, the reasons proposed by participants in their explanations suggest that the use of

everyday behaviours is acceptable for women as they do not burden healthcare services or are less likely to be judged negatively. These could be considered feminine concerns, as they reflect traits previously associated with femininity, such as empathy, compassion, and benevolence [23; 53], as well as reflect issues implicated in women's pain experiences, such as struggling for legitimacy [47].

Associations with femininity and the lack of burden to the UK's National Health Service (NHS) were explicitly recognised as reasons for ranking the aforementioned strategies as the most acceptable:

> *"It's things that you can do, that don't actually bother the health service in any way, that don't involve taking medication, and stuff, um and are coded more feminine, from a social point of view."* [Female 2]

The neutral items were not considered unacceptable responses to pain by interviewees, but simply less acceptable than the 'acceptable' options. The strategies involving seeking professional help fell in the neutral area of the grid (e.g. 'visit GP' 0), and when asked *why* these were less acceptable than everyday behaviours, one participant said:

> *"You do it anyways, so it's just like, it's like secretly helping, so people don't really realise it, so it's acceptable, whereas like, if you go and see someone, some people can be like 'oh, well you don't need to see someone'."* [Female 3]

This quotation in particular highlights the view that women can face adverse judgement when consulting a professional about their pain when others think they "don't need" to. This issue has been reported in previous studies by women when reflecting on their help seeking for pain [47]. If so, it is possible that asking other women for advice and drinking water is was seen as more acceptable ways of relieving pain, as was less of a burden on healthcare services. The desirability of avoiding this burden was highlighted by another participant:

> *"I think you'd get respect for that from British people, 'cause they like that stoicism, and they think, it's not costing anybody anything."* [Male 2]

The items ranked as unacceptable strategies are similar to those in Stereotype 1, which may explain why the two are somewhat correlated (0.45). The interview data, however, reveal that participants holding this viewpoint are more concerned with gender norm conformity, whereas participants holding the previous viewpoint were more concerned with analgesic efficacy. From this second viewpoint, the least acceptable strategies for

women seem to be those with typically 'masculine' connotations, such as 'hit/break something' (-5) or 'smoke a cigarette' (-5). These behaviours can be considered 'masculine' based on broader gender stereotypes that men are aggressive and more prone to risky health behaviours [10]. The gendered nature of this viewpoint is highlighted by the ranking of 'take Viagra' at -6. There are claims for the analgesic properties of Sildenafil [15], but this is not common knowledge, and far outweighed by Viagra's reputation as a male product used to treat erectile dysfunction:

> *"I think if you were a woman and you said you were taking Viagra, I think people would think you were either off your rocker… they would be completely taken aback by it, and they'd think that you were making a statement by saying it, and you probably weren't actually doing it, you were just having a bit of a laugh."* [Male 2]

The composition of this factor, interpreted in relation to participant comments and existing theory and research, suggests that what is socially acceptable for a woman depends on whether the strategy conforms to broader feminine norms and stereotypes, including not burdening others. This could include healthcare services, which may sometimes be viewed as less acceptable, partially to avoid any negative judgements. This supports the idea that some believe women should keep a 'stiff upper lip' when in pain [11]. The interview data reveal that the pressure to behave in this way may be motivated by the desire to avoid social disapproval, with women expected to behave in typically feminine ways when in pain, and to avoid the negative labels which are sometimes ascribed to women in pain [47]. Interestingly, when looking at the individuals who formed the current factor, it was mainly women who held this view. It is possible that men may be less aware of the ways in which women can be constrained by gender norms.

Female pain relief stereotypes: consensus and distinguishing statements

So far, our interpretation suggests that participants holding the viewpoint outlined in Stereotype 1- *normative and effective pain relief for women*- based their judgements about the social acceptability of each strategy on how effective it is generally perceived to be in relieving pain. Meanwhile, it seems as though participants who held the viewpoints reflected in Stereotype 2- *conformity to traditional feminine norms*- based their judgements on whether the strategy conformed to or violated feminine gender norms. The consensus and

distinguishing statements reinforce this interpretation. Focusing on the 'extremes' (the strategies ranked -6, -5, +5, +6) reveals that across both viewpoints, 'breathe slowly and deeply' and 'take a warm bath/shower' are acceptable forms of pain relief for women, whilst 'swearing', 'rant', 'Botox', 'smoke a cigarette', 'hit/break something', and 'smoke cannabis' are not. However, the degree to which these judgements are made seems to vary depending on whether the individual making the judgement believes acceptability depends on gender norm conformity or perceived analgesic efficacy. Because of the overlap between what is considered 'masculine' and what is considered 'ineffective' when it comes to pain relief, participants in this study appeared to rank these strategies in a similar way but for different reasons. This suggests that the factors represent two distinct viewpoints, rather than alternative manifestations of the same viewpoint.

Distinctions between the two viewpoints become more apparent when considering the distinguishing strategies, i.e. the strategies which were ranked significantly differently across the two stereotypes. For example, 'taking Viagra' was ranked as significantly more unacceptable in Stereotype 2 (*conformity to traditional feminine norms*) than in Stereotype 1 (*normative and effective pain relief for women*). 'Taking Viagra' is arguably the most 'male' behaviour in the Q-set, so the fact it is significantly more unacceptable in Stereotype 2 supports our interpretation of this viewpoint as being concerned with gender norm conformity. Despite not being a common way of relieving pain, it is ranked higher in Stereotype 1, presumably due to the perception that there are other strategies even *less* likely to relieve pain, and even *more* likely to cause harm. 'Drink water' is ranked significantly higher in Stereotype 2 than Stereotype 1, supporting the interpretation that Stereotype 2 is concerned with implementing everyday strategies which will not burden others, socially or economically. The fact that 'ask female friend/relative for advice' joins 'drink water' on the top spot, followed closely by 'hug someone', supports the idea that strategies which meet these criteria as well as being typically 'feminine' are also considered acceptable. This distinction is further evinced by the fact that 'take prescribed painkiller', 'ring 111', 'physiotherapy', 'visit GP', and 'ask healthcare professional for advice' are significantly more acceptable in Stereotype 1 than Stereotype 2.

Study 2: Norms and stereotypes for men

The aim of this study was akin to Study 1, this time focusing on socially acceptable and unacceptable pain relief strategies for men. Ten different students (5 male, 5 female), 5 members of academic staff (3 male, 2 female), and 15 members of the general community (8 male, 7 female) completed the Q-sort following the instruction: "In this society, if a man is in pain, how acceptable is it for him to use this behaviour to relieve his pain?". The median age in this study was 30 years (*M*= 35.43 years; *SD*= 15.43; range 18-78). Student ages ranged from 18 to 31, with a mean age of 25.00 (*SD* = 4.08), whilst staff ages ranged from 28 to 48, with a mean age of 34.40 (*SD* = 8.02). The mean age of the members of the general community was 42.73 (*SD* = 18.14), with a range of 18 to 78. Three participants reported being in pain (2 male, 1 female, all general community), whilst two participants reported chronic pain (1 male general community, 1 female student). The majority were heterosexual (90%), in a relationship (39%), lived with their partner (23%), were White (87%), native English speakers (77%), born in the UK (71%), and held a Master's degree as their highest qualification (32%).

Similar to Study 1, the analysis revealed three factors with eigenvalues above 1 (10.89, 4.93, 2.10), but again, the third sort violated the required criteria for retention. The analytic process was repeated, once again requesting and rotating two factors, which confirmed that the maximum solution supported by the data consisted of two factors, each of which were defined by at least two non-confounding Q-sorts. This time, the correlation between the two factors was 0.23, suggesting two separate viewpoints. The two-factor solution explains 53% of the variance, and accounts for 22 of the 30 Q-sorts.

Stereotype 1: Conformity to traditional masculine norms (Figure 4.3)

In this society, if a man is in pain, how acceptable is it for him to use this behaviour to relieve his pain?

COMPLETELY UNACCEPTABLE **Stereotype 1** **COMPLETELY ACCEPTABLE**

Aroma-therapy	Botox	Look at something beautiful	Pray	Smoke Cannabis	Play with a pet	Eat comfort food	Drink a sugary drink	Take a cold bath/ shower	Rant	Apply ice	Drink a beer	Hope the pain will go away
Seek counselling	Hug someone	Take anti-depressants	Corrective surgery	Massage from prof masseuse	Calcium/ magnesium	Eat spicy foods	Drink a glass of wine	Hit/ break something	Smoke a cigarette	Touch/ clutch sore area	Swearing	Ignore the pain
	Hypnosis	Yoga	Drink herbal tea	Hot water bottle	Take cod liver oil	Breathe slowly & deeply	Drink water	Injections	Physio	Take a prescribed painkiller	Take OTC painkiller	
		Meditation	Ask male friend/ relative for advice	Ask female friend/ relative for advice	Take Viagra	Have an orgasm	Think about sex	Do a hobby	Take a warm bath/ shower	Topical gel/ cream		
			Acupuncture	Ring 111	Visit GP	Ask healthcare prof for advice	Seek info online	Massage from partner	Sports massage			
				Biofeedback	Electrical stimulation device	Go to A&E	Listen to music	Go to sleep				
					Watch a movie	Aerobic exercise	Do something sociable					
						Go for a walk						

Figure 4.3. Factor array for male stereotype 1 (Conformity to traditional masculine norms)

This factor explained 36% of the variance in the Q-sorts in this study, and is defined by 12 Q-sorts (6 female, 6 male). The most acceptable strategies are typically 'masculine' behaviours such as 'hoping the pain will go away' (+6) and 'ignoring the pain' (+6), followed by 'drinking a beer' (+5) and 'swearing' (+5). These behaviours can be interpreted as 'masculine' in light of existing research and theory that suggests men are thought to typically ignore pain [27] and to avoid seeking help [1], due to stoicism being a core component of hegemonic masculinity [9]. There is also evidence that drinking beer [13] and being aggressive [50] are considered characteristics of masculinity. 'Taking an over-the-counter painkiller' was also ranked highly (+5), followed closely by 'taking a prescribed painkiller' at +4. Interview data suggests that this is because, following a more stoic response, it is acceptable for men to use quick-fix strategies that will directly tackle the pain:

"I think for a lot of people, it's that manly scale of "well I don't need medicine first of all, I'll get through it", and secondly if they can't do it then they want the easiest solution which is quickly just pop down to the corner shop and buy some 50p paracetamol and ibuprofen and see if that gets the job done." [Male 3]

Moving from acceptable towards neutral items, there are some everyday behaviours (e.g. 'do a hobby' 2), which interviewees reported were acceptable because they do not necessarily express any pain, or let anyone else know anything is wrong. The exceptions to this were strategies which are linked to sports injuries, such as 'apply ice' (4) or 'physiotherapy' (3). Although these may signal injury to others, this is compensated for by their sports connotations:

"It kind of carries the associations of being a professional athlete, which is something that's desirable for men to be, so, although you shouldn't be injured, if you are injured, at least you're behaving like a professional athlete." [Male 4]

Amongst the neutral strategies were 'ask a healthcare professional for advice' (0) and 'visit GP' (-1), posing a contrast to physiotherapy, which was ranked as more acceptable. The difference in acceptability between physiotherapy (3) and visiting a GP (-1) is explained:

"I think people, or men, are more happy to be seeing a physiotherapist, um, and it comes up in context more that, "oh yeah, I'm seeing my physio next week…", whereas GP's I think are associated with all sorts of ailments, um, so you wouldn't want to admit going to your GP so readily, because, you could be going to your GP for anything other than maybe a sort of, physical injury." [Male 4]

These words allude to the stigma surrounding mental illness, particularly for men, who may not wish to be seen as seeking help for anything other than a physical injury. The stigma men face in relation to mental illness is further emphasised by the fact that 'seek counselling' (-6) is one of the least acceptable strategies from this viewpoint:

"In terms of societal expectations around what men should and shouldn't do, counselling is probably something that is considered to be, um, too effeminate, and too based on the emotions." [Female 4]

The association between femininity and psychological struggles is well-documented, making psychological conditions and associated behaviours less acceptable for men [34]. This association with femininity may also explain the other strategies ranked towards the unacceptable end, including 'aromatherapy' (-6), 'hug someone' (-5), and 'Botox' (-5). One participant considered aromatherapy the least acceptable because:

> *"I can imagine lots of comments about things like, "that's so gay[1]"... and then also just, kind of, disregard for anything, that is perceived to have no scientific basis, so it's not rational enough, or it's too, say, soft."* [Male 4]

When interpreting this factor, it seems as if it is socially acceptable for men to use typically 'masculine' strategies to relieve their pain. These strategies do not seem to allow pain to be revealed to others, with the exception of strategies with sporting connotations. Interviews suggest it may be acceptable for men to take painkillers as a 'quick fix' to their pain, but less acceptable to seek professional help. This factor was also characterised by the avoidance of femininity, with interviewees suggesting that typically 'feminine' strategies were considered too effeminate and "soft" for a man to use.

[1] 'In 2018 UK parlance 'gay' in this context is used as an adjective to describe a behaviour that is embarrassing' https://www.theguardian.com/education/2015/dec/21/the-gay-word-what-does-it-mean-when-young-people-use-it-negatively

Stereotype 2: Normative and effective pain relief for men (Figure 4.4)

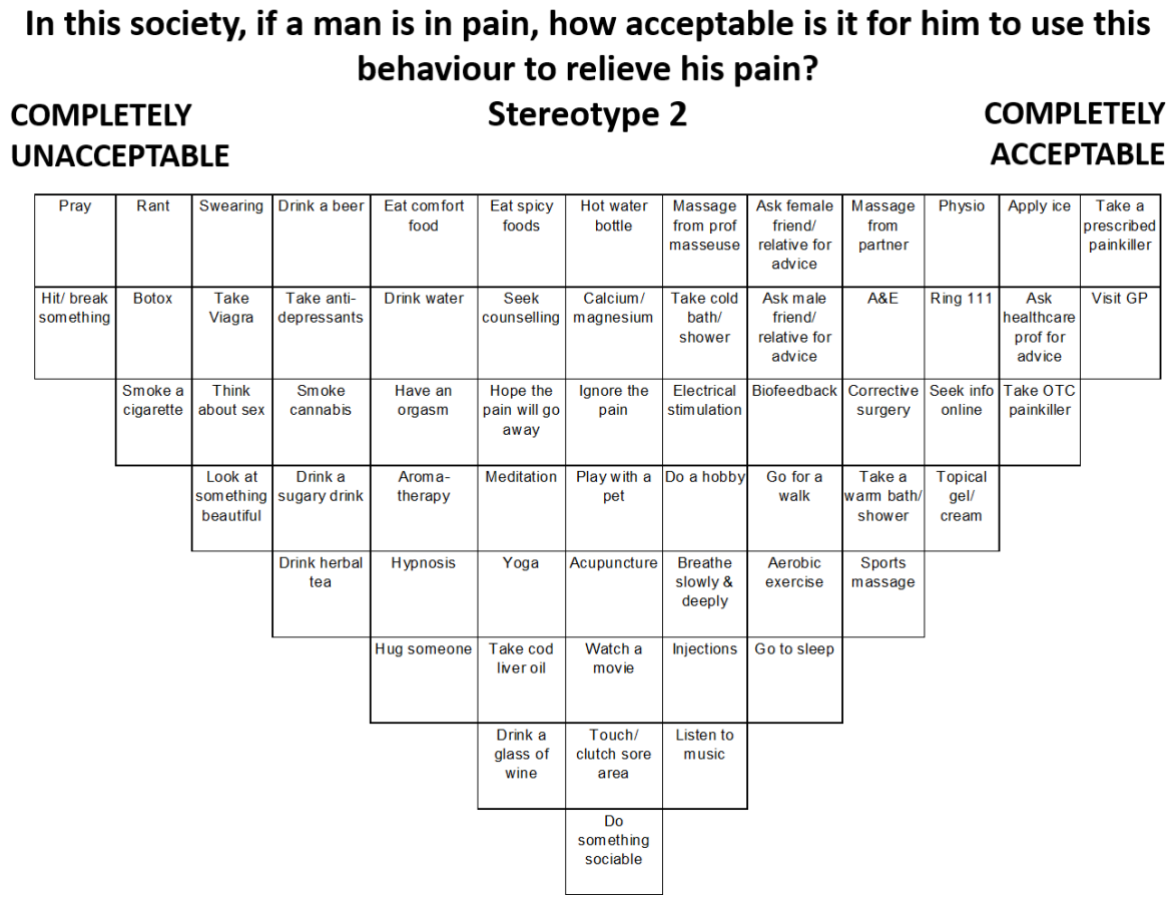

Figure 4.4. Factor array for male stereotype 2 (Normative and effective pain relief for men)

This factor explained 16% of the variance in the Q-sorts in this study, and is defined by 10 Q-sorts (5 female, 5 male). It shares many commonalities with '*normative and effective pain relief for women'* in the previous study, as it suggests it is also acceptable for men to use conventional pain relief strategies which are generally perceived to be effective. However, as the two viewpoints emerged in response to different instructions (women in Study 1, and men in Study 2), the factors have been labelled to recognise this distinction.

This factor suggests it is most acceptable for men to use strategies generally considered likely to relieve pain (e.g. 'visit GP' +6; 'ask a healthcare professional for advice' +5). Again, these seem to directly tackle the source of the pain (e.g. 'take prescribed painkiller' +6; 'take over-the-counter painkiller' +5; 'apply ice' +5). One participant highlighted that this acceptability was due to the perceived effectiveness of the strategy

"I think it's probably the most, kind of, sensible thing to do, erm, I think it's one of the most effective, and yeah I… I'd never double, I'd never think about something twice if someone said "oh yeah, I was in pain so I went to the GP", that just seems like the natural thing to do." [Male 5]

Interestingly, there were some stipulations in the interviews that these acceptable strategies represented what people *should* be doing to relieve their pain, but recognised that not all men do these things:

"They're not seen as things, by society, that are unacceptable, they're seen as things that you should do, it's just men often don't, I think." [Male 6]

As before, the neutral strategies in this factor seem to be everyday behaviours that may not directly tackle the pain, but are also unlikely to do any damage either, such as 'play with a pet' (0) or 'do something sociable' (0). It is possible that this is because these are not seen as common or effective responses to pain as, moving towards the unacceptable end of the factor array, the importance of perceived analgesic efficacy is again highlighted. For example, one participant recognised that 'drinking a beer' (-3) was a typically 'male' behaviour, but that the perceived lack of efficacy outweighs this in relation to pain relief:

"Drinking a beer is probably normal for a lot of men to do it, but I don't think it's, a medically acceptable way to relieve pain." [Male 6]

The interpretation that it is unacceptable to use behaviours which may be seen as likely to cause further harm despite generally having masculine connotations is supported by the least acceptable items (e.g. 'hit/break something', -6; 'smoke a cigarette' -5). It seems that any gendered connotations of the strategies are overridden by the extent to which they are deemed ineffective in relieving pain, with one participant explaining why he ranked 'hit/break something' as unacceptable:

"It doesn't work, that's why I kind of put them there… I don't think it's exactly a pain relief, so I guess in some ways it's more of a… "well it's not going to work, so why would you do it"… kind of thought process." [Male 5]

Similar to '*normative and effective pain relief for women',* this factor again suggests there is a shared understanding of which strategies are considered most

effective in relieving pain, and these are the most socially acceptable options for a man in pain. Interviewees acknowledged that men don't always *do* these things, but that it would be socially acceptable for them to do them. Typically masculine strategies were ranked as neutral or unacceptable if they were not seen as effective methods of relieving pain; this suggests that perceived analgesic efficacy outweighs gender norm conformity in this factor.

Whilst the proportions of men and women's views differed somewhat in Study 1, it is interesting that the same number of men and women exemplified each of the stereotypes in this study. This suggests that there may be more agreement amongst men and women about the social rules for men's pain behaviours compared to women's. This is further evinced by the fact that overall there were more defining participants for each of the factors in this study than in Study 1, suggesting more distinct and well-defined views of how men are expected to respond to pain.

Male pain relief stereotypes: consensus and distinguishing statements

Our interpretation of the two male stereotypes suggests that those holding the *conformity to traditional masculine norms* viewpoint based their judgements about the social acceptability of each strategy on whether it conformed to or violated masculine gender norms, whilst those holding the *normative and effective pain relief for men* viewpoint based their judgements on the perceived analgesic efficacy of the strategy. Once again, we compared the consensus and distinguishing statements to corroborate this interpretation.

Focusing on the consensus strategies which lie at the extremes (-6, -5, +5, +6), there seems to be agreement across both viewpoints that 'apply ice' and 'take over-the-counter painkiller' are acceptable forms of pain relief for men, but that 'Botox' and 'hug someone' are unacceptable. This appears to support our interpretation, as 'apply ice' could be ranked as acceptable in both viewpoints because it is seen as effective in directly tackling the pain, but also has masculine connotations as it is typically associated with sports injuries. Similarly, taking over-the-counter painkillers is also seen as effective in directly tackling the pain, and meets the requirement of a quick-fix response favoured by men. Botox may be seen as unacceptable in both as it can be considered both effeminate and ineffective, as can hugging someone.

When examining the distinguishing strategies, 'aromatherapy', 'seek counselling', and 'hypnosis' are significantly less acceptable in *conformity to traditional masculine norms*

(Stereotype 1) than *normative and effective pain relief for men* (Stereotype 2). This supports our interpretation, especially since the rejection of feminine behaviours is considered a key facet of hegemonic masculinity [9]. Aromatherapy could be considered feminine because of its sensual nature, whereas seeking counselling involves a degree of emotional expression that might be expected of women only. Hypnosis and other 'alternative' therapies may be considered feminine as they may be perceived as 'soft' strategies, and are often used more by women [17]. Considering the distinguishing, acceptable statements, 'drink a beer', 'swearing', 'hope the pain will go away', and 'ignore the pain' are all significantly more acceptable in Stereotype 1 than Stereotype 2. This supports the interpretation that Stereotype 1 favours typically 'masculine' behaviours regardless of their perceived analgesic efficacy. Moreover, other typically 'masculine' behaviours such as 'hit/break something', 'smoke a cigarette', and 'rant' are significantly less acceptable in Stereotype 2, further suggesting that Stereotype 2 is less concerned with men behaving in a typically masculine way, and more concerned with the degree to which each strategy will relieve pain. As further evidence, 'ask a healthcare professional for advice', 'take a prescribed painkiller', and 'visit GP' were significantly more acceptable in Stereotype 2 than Stereotype 1.

Discussion

In two studies exploring perceptions of the social acceptability of men and women using different methods of relieving pain, four narratives emerged; '*normative and effective pain relief for women', 'conformity to traditional feminine norms*', '*conformity to traditional masculine norms',* and '*normative and effective pain relief for men'*. The predominant stereotype for women is based on perceived analgesic efficacy, but for men is based on gender norm conformity. This supports the idea that masculinity poses more obvious barriers to pain expression and relief than femininity [1; 26]. However, the emergence of the secondary viewpoints show that being a woman is not without its constraints when choosing and using pain relief, nor are men entirely limited to gender norm conformity.

Two female pain relief stereotypes emerged: *normative and effective pain relief for women* (Stereotype 1) and *conformity to traditional feminine norms* (Stereotype 2). Stereotype 1 seems to be focused on the perceived analgesic efficacy of each strategy, grounded in unwritten, and relatively ungendered understandings of 'correct' and 'incorrect' ways of responding to and relieving pain. Stereotype 2 was interpreted as being more

gendered, with pain relief strategies with 'masculine' connotations deemed unacceptable, and typically 'feminine' strategies considered more acceptable. From the interviews, there is a view that women in pain should not burden others; they should do something ordinary which may also have hidden analgesic properties to avoid any negative judgements. This includes typically 'feminine' behaviours, such as asking a female friend/relative for advice or hugging someone. Overall, this second stereotype appears to reflect common notions of femininity held in Western societies, such as being calm, respectful, and modest about sex, as well as expressing affection, and being sociable and relational [4; 40]. Despite generally being deemed a 'masculine' trait, this viewpoint also applauds female displays of stoicism towards pain, rather than utilising professional healthcare services. Others have found that use of such services can result in women feeling negatively judged [47]. If so, then avoiding such services might prevent such judgements, and reflect traditional characteristics of femininity such as being empathetic, compassionate, and benevolent [23; 53].

It is possible that this second stereotype developed in response to women frequently experiencing pain [18], causing them to need to develop quick, cheap, and easy to implement strategies to reduce the interference of pain in their lives and to avoid any negative judgements. The interviews revealed that expressing pain and publically declaring one's choice of pain relief may spark judgement from others, particularly in terms of the severity of the woman's pain and whether others deem her to be choosing the 'correct' response. At first glance, one could argue that femininity does not pose barriers to pain relief as feminine stereotypes encourage emotional expression and taking care of one's health [22; 31]. However, this viewpoint suggests that British women can be judged for expressing pain and their choice of pain relief, which could prevent them from effectively relieving their pain.

Two stereotypes also emerged for men: *conformity to traditional masculine norms* (Stereotype 1) and *normative and effective pain relief for men* (Stereotype 2*)*. Stereotype 1 is characterised by notions of traditional masculinity in Western cultures; stoicism, strength, independence, and the rejection of femininity [4; 9; 39]. Many of the 'acceptable' pain relief strategies for men seem to covertly tackle the psychological experience of pain rather than potentially overt strategies to tackle the source of the pain. Observable pain relief strategies may signal pain to others, which could cause them to question his masculinity. These findings support the broader literature on gender norms related to coping with pain, which show that men tend to hide weakness in public [47]. Stereotype 2, on the other hand, suggests that it is

acceptable for men to directly tackle the pain at its source and to use the forms of pain relief perceived as most effective, even if it reveals the pain to others.

Both stereotypes suggested that it is acceptable for men to take painkillers. Whilst this is surprising given the evidence that women are more likely to take medication, including analgesics, than men [56; 58], it supports the finding that men may prefer quick fix solutions to their problems [5]. There is also existing evidence that men do not utilise healthcare as much as women [1; 58], and Stereotype 1 supports the explanation that this is because it is not considered 'manly' [1]. However, the emergence of Stereotype 2 may indicate that perceptions are shifting, with one participant reflecting that:

"The people I know, would just kind of go with, oh the most effective option, rather than going for like the riskier… yeah I'm sure it's all changed quite a lot, I guess a lot, a lot of the time men would probably be more, kind of… kind of, yeah, just "I'll just deal with it myself, just ignore it, just carry on" and stuff, but… I think now it's more, kind of, "well if I'm in pain, I might as well get it sorted"… like I've said, like, as fast as possible, and as efficient as possible." [Male 5]

It is possible that Stereotype 2 will become the predominant expectation for men over time. This seems plausible given that what it means to be a man is changing [35]. Indeed, the emergence of the *normative and effective pain relief* factors could suggest that to some, it is socially acceptable for both sexes to pursue what they consider to be effective pain relief without the constraints of gender norms and expectations. Although these viewpoints emerged in response to sex-specific instructions, it would be interesting for future research to explore how the general population ranks the effectiveness of these pain relief strategies generally, without reference to the sex of an individual or social acceptability. This is particularly pertinent given the potential discrepancy between which strategies are *perceived* as effective compared to evidence of actual efficacy. However, the more predominant emergence of the *conformity to traditional masculine norms* stereotype at this time suggests that for many this is still the overarching expectation in this society for men in pain.

Our results shed light on the social context of health for both men and women. As expected, there are rules and norms surrounding male use of pain relief, but there are also conditions for female pain relief. In terms of practice, different perceptions of acceptability may produce gender-related barriers, which may influence not only an individual's self-

management of pain, but also their willingness to comply with and adhere to pain management advice. For example, a woman may resist visiting her GP for fear of burdening the NHS, whilst a man may refuse to attend counselling to treat the psychological elements of his pain lest it threaten his masculinity. The extent to which these actions may be maladaptive depends on the individual context and the type of pain being experienced [19]. Further research is required to clarify the extent to which gender-related barriers complicate compliance and treatment adherence, but these often latent and unquestioned biases certainly warrant consideration in healthcare contexts.

We recognise that this is just one interpretation of the data, based on a homogenous sample. Interpretation of Q-sorts requires us to interpret and make sense of the data, which we did based on the supporting interviews and background literature. Others may view these data in different ways. These participants might hold different views to those living in other regions, with different education levels, and ages. Although we found no evidence of an age effect in these studies, a possible generation effect might exist in the general population, with older and younger members of society holding different perspectives of gender norms and their enforcement [38]. Limited by the available respondents, it is unlikely that this is a complete set of the cultural stereotypes surrounding appropriate use of pain relief in British society, and future research should explore how pervasive these views are across different social groups, as well as comparing perceptions across cultures. However, it is in this society the Q-set was developed, and other, unknown pain relief strategies might need to be incorporated into the Q-set to fully capture the social acceptability of a range of pain relief strategies for men and women in different cultures [12]. For now, there is initial evidence of the existence of these stereotypes in British society, and future research ought to test whether these stereotypes influence pain relief choices, and if so, whether perceptions can be manipulated to change the way men and women use pain relief

Our findings provide initial evidence for gendered and relatively ungendered beliefs about the social acceptability of a range of pain relief strategies. Whilst the 'normative and effective pain relief' stereotypes were similar for both men and women, the gendered viewpoints varied for men and women in line with broader notions of masculinity and femininity. This warrants consideration by practitioners implementing pain management programmes, as well as in guiding individual pain self-management, to maximise the chances of effectively relieving pain.

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Chapter Five: Factors influencing the social acceptability of men and women's pain relief

Primary paper:
Wratten, S., Eccleston, C., & Keogh, E. (in prep). Gendered and ungendered constructions of the social acceptability of pain and its communication.

Background

The aim of Chapter 4 was to explore perceptions of norms and stereotypes in relation to men and women's use of pain relief. A key finding was that the predominant viewpoint/stereotype for women is that it is most socially acceptable for them to use more conventional methods of pain relief which tend to be considered more effective than more alternative methods of pain relief. For men, the predominant stereotype was that it is most socially acceptable for men to use pain relief strategies which conform to traditional masculine norms, even at the expense of effectively relieving their pain. However, secondary stereotypes also emerged, suggesting that some people do hold the viewpoint that feminine stereotypes can inhibit women seeking optimal pain relief, and some believe it most socially acceptable for men to use conventional and effective pain relief.

Whilst the Q-methodology employed in Chapter 4 provided the factor arrays which conveyed participants' viewpoints, the arrays themselves revealed little about the reasons underlying these viewpoints. Therefore, the aim of this chapter is to explore the factors which influence perceptions of norms and stereotypes related to men and women's use of pain relief by reporting the results of semi-structured interviews conducted with a sub-set of the participants who completed the Q-sort task in Chapter 4. These interviews were conducted to achieve the goal of gaining a deeper understanding of the reasons for the viewpoints which were reported in the previous chapter. This chapter not only contributes to the overall thesis aim of understanding how sex and gender are related to use of pain relief, particularly the challenges which gender norms can pose, but further explores the role of motivation. In addition to the factors underlying perceptions of men and women's use of pain relief, this chapter specifically explores the anticipated negative social consequences for pain relief norm violation; increasing our understanding of the role of other-related motivation for pain relief.

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Formulation of ideas (80%): As the idea for this study stemmed from discussions regarding the previous study, again the idea was proposed by myself and refined based on discussions with my supervisors

Design of methodology (80%): The methodology was again my choice, but I received some guidance from my supervisors based on their experiences of conducting semi-structured interviews

Experimental work (100%): I conducted all of the experimental work myself

Presentation of data in journal format (80%): I drafted the paper and received critical feedback from co-authors</td></tr>
<tr><td>Statement from candidate</td><td colspan="9">This paper reports on original research I conducted during the period of my Higher Degree by Research candidature.</td></tr>
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"Gendered and ungendered constructions of the social acceptability of pain and its communication"

Abstract

Social norms are known to influence health behaviours, including pain behaviours. Whilst sex and gender are theoretically relevant to pain experiences and responses, we do not know if or how gender norms relate to the use of pain relief, or whether there are ungendered representations of pain relief. This study considers factors influencing the social acceptability of pain relief behaviours for men and women. Twenty participants aged 18-60 took part in semi-structured interviews about their perceptions of social rules and norms in relation to men and women's use of pain relief, and the perceived consequences of norm violation. Inductive thematic analysis identified three themes associated with the social acceptability of different forms of pain relief: '*gender norms applied to pain contexts'*, '*effectiveness of pain relief strategies'*, and '*the sociocultural context of pain*'. Exploration of these themes found that there are both gendered and ungendered representations of pain relief influencing social acceptability, and that these norms are both the product and producers of the social context in which pain occurs. Perceived social consequences of norm violation mostly related to a risk of adverse judgement by others. The results provide a rich and detailed account of the ways in which social norms influence pain relief expectations, and shed light on how and why men and women might use pain relief.

Keywords

Gender stereotypes; Gender norms; Pain; Pain relief; Masculinity; Femininity

Introduction

Pain, defined as "a distressing experience associated with actual or potential tissue damage with sensory, emotional, cognitive, and social components" (de C Williams & Craig, 2016, p. 2), is an unavoidable part of life. However, the individual experience and impact of pain is variable, making understanding this variability critical for better pain management (Von Korff, Ormel, Keefe, & Dworkin, 1992). For example, women experience and report pain more often, and of a greater intensity, than men (Bartley & Fillingim, 2013; Unruh, 1996). Men and women also report coping with pain in different ways, for example women report using relaxation, emotional support, and social support more than men do (Unruh, Ritchie, & Merskey, 1999). It is essential to understand these sex differences in pain behaviours, as responses to pain can determine the impact pain has on one's life.

Sex differences in reported use of pain coping strategies may be influenced by gender norms (Racine et al., 2015), which can guide a range of health behaviours (Lyons, 2009). Indeed, a recent review highlighted the distinctions between sex and gender and the importance of considering both in pain research (Boerner et al., 2018). The predominant gender stereotypes in Western societies seem likely to apply to pain contexts given that hegemonic masculinity prohibits emotional expression and help-seeking (Addis & Mahalik, 2003), whilst femininity is characterised by expressing emotions, depending on others, and being health-conscious (Lyons, 2009). When men behave in accordance with masculine stereotypes, and women with feminine stereotypes, this norm conformity upholds these gender stereotypes (Cialdini & Trost, 1998).

Indeed, there is evidence that there are gendered expectations of how men and women should behave when in pain which reflect these broader gender stereotypes. Robinson et al. (2001) found that both sexes reported women as more willing to report pain than men, and men as less sensitive and better able to endure pain than women. Similar findings have been found across cultures (Nayak, Shiflett, Eshun, & Levine, 2000) and occupations (Leung & Chung, 2008), and in these instances men were particularly less accepting of pain behaviours in other men. Taken together, it seems that pain expression and endurance are gendered pain behaviours, thus creating different expectations for men and women in pain.

Gendered expectations and stereotypes may influence pain behaviours through gender norm conformity; often motivated by implicit or explicit threats of punishment for norm

violation, including both verbal and physical harassment, shame, and embarrassment (Bosson, Taylor, & Prewitt-Freilino, 2006). Such negative responses are evident in Bernardes and Lima (2010)'s work, finding that both laypeople and nurses perceived men with chronic pain as less dominant, and more dependent and vulnerable than the 'typical' man. Interestingly, the presence of pain also influenced perceptions of women; women with chronic pain were considered to be as dependent as the 'typical' woman, but less expressive. This suggests that the presence of pain can influence perceptions of men and women compared to stereotypical men and women.

Whilst Bernardes and Lima (2010) studied hypothetical perceptions, it seems that fear of punishment for gender norm violations does influence real-life help-seeking, especially for men. For example, Galdas, Cheater, and Marshall (2007) found that, for British men, the fear of being seen as 'weak' led them to avoid disclosing pain to others and to delay seeking medical help. However, further research is needed to explore how gender norm conformity influences how both men and women respond to pain in other ways, including use of pain relief.

Pain does not occur in a social vacuum; social factors such as gender expectations, stereotypes, and norms influence responses to pain. Expectations for how men and women should behave when in pain have been demonstrated. A repeated observation is that having pain can negatively distance individuals from the social construction of 'typical' men and women. Moreover, there is evidence that gender norm conformity can influence whether and how quickly one seeks help for pain. However, little research has explored how specific ways of relieving pain may be influenced by social norms, including gender norms, and understanding such influences might help to improve pain management. The aim of this study was to identify factors influencing the social acceptability of various pain relief behaviours for men and women, including the perceived social consequences of norm violation.

Methods

Participants

Twenty participants were interviewed. Ten reported their sex as male, nine female, and one male-to-female transgender. Nineteen reported their sexuality as heterosexual, one as homosexual. The sample mean age was 32.40 years (*SD* = 12.13) with a median of 29.50 and

a range of 18-60. Five participants were currently in pain, and three reported having chronic pain. All were White, and 85% were born in the United Kingdom. The semi-structured interviews were part of a larger project exploring gendered pain relief. This sample is taken from a larger sample of sixty participants who undertook a Q-methodology study (Wratten et al., 2019). In the Q study participants sorted 62 ways of relieving pain and were asked to judge their social acceptability for either a man or a woman. In this study, the sample of twenty was taken from those who expressed a willingness to be interviewed. To gain a range of perspectives, it was decided a priori that an equal number of males and females from both academic and non-academic groups would be interviewed. Beyond that, interviewees were selected on a first come, first serve, voluntary basis. Ethical approval was granted by the relevant University ethics committees.

Interviews

Potential participants were provided with an information sheet for the study and their informed consent was obtained. A semi-structured interview schedule (see Figure 5.1) was used, developed based on the recommendations of Watts and Stenner (2012), to gain a deeper understanding of how people judge the social acceptability of different pain relief strategies. In this study, the Q sorting task that preceded the interviews was considered a form of context-setting. Rather than have to introduce the concepts and ideas to participants in a standardised rubric or explanation, the interviews followed after people had considered and made judgements about the topic.

The interviews took place face-to-face in a quiet, private room at a University in the United Kingdom. All interviews were conducted by the first author and were digitally recorded and transcribed verbatim. All interviewees were paid £10 for completing both the Q-sort task and their follow-up interview. Pseudonyms are presented throughout this paper.

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Interview Schedule

1. You chose __ as the most acceptable behaviour for a (wo)man. Why is that? Why did you rank it so strongly?
2. You chose __ as the least acceptable behaviour for a (wo)man. Why is that? Why did you rank it so strongly?

[Look at unacceptable items that do not necessarily reflect wider gender stereotypes]

3. Why was this ranked as unacceptable? Is it specific to pain?

[Highlight the neutral items, not acceptable items in centre]

4. What about these neutral strategies? Were you undecided, or neutral? Why?
5. Why did you place these strategies here?
6. What role do these neutral strategies play in your overall sort?
7. How are these neutral strategies different to the extremes?

[Identify any unusual placements e.g. similar items spread out and ask about them]

8. Are there any strategies you would like to talk about in particular?
9. Are there any strategies that you think are particularly relevant or significant?

[For the most extreme/important behaviours]

10. What do you think the social consequences or reactions would be if a (wo)man did this when in pain?
11. What makes you think that?
12. Would it be any different for a (wo)man?
13. Is there anything else you would like to discuss that you think might be relevant?

Figure 5.1. Semi-structured interview schedule

Analysis

During the interviews participants reflected on the factors determining the social desirability of pain relief in relation to both men and women, allowing for the data to be analysed collectively for common themes. Thematic analysis was used as the most appropriate way to study how people form and sustain common ideas (Joffe, 2012), in this case ideas about the social acceptability of men and women's use of pain relief. Due to the exploratory nature of this research, inductive thematic analysis was used, allowing themes to freely emerge from the data rather than searching for themes based on pre-existing theory (Braun & Clarke, 2006).

The five phases of thematic analysis outlined by Braun and Clarke (2006) were followed. The first phase involved familiarising ourselves with the transcripts of the verbal data for the twenty interviews. We then generated initial codes of interest that captured basic but meaningful elements. The third phase involved searching for themes across these codes;

an iterative process in which several codes and potential themes were discarded due to insufficient or overly diverse data, whilst others collapsed into one another. Phase four involved reviewing the retained themes by re-reading the collated extracts for each theme and considering whether the compiled extracts formed a coherent pattern. In the fifth and final phase, the themes were then finalised and named.

We took numerous steps to ensure methodological quality in this research, including following the guidelines of Elliott, Fischer, and Rennie (1999) and Shenton (2004). In particular, the results of this study were reviewed and agreed upon by all authors, the study methodology and findings were discussed at different stages of the research process with other qualitative researchers, and despite the researchers' focus on gender, all themes were explored regardless of whether they reflected aspects of gender.

Results

All interviews lasted an average of 34 minutes (range: 17-45 minutes). Overall the interviews generated 33 codes of interest. We reduced these codes to three overarching themes relating to the social acceptability of men and women's use of pain relief strategies, and four subthemes. We labelled the three themes: '*gender norms applied to pain contexts*', '*effectiveness of pain relief strategies'*, and '*the sociocultural context of pain'*.

1) Gender Norms Applied to Pain Contexts

Gender norms were certainly considered relevant to pain and pain relief, as many participants referred to broader masculine and feminine stereotypes in determining which pain relief strategies were (un)acceptable for men and women. Two subthemes emerged: "*gendered emotional expression"* and "*pain-induced loss of power and ways to regain it".*

Gendered emotional expression. Certain analgesic behaviours were considered (un)acceptable for men and women in accordance with broader gender stereotypes. In accordance with masculine stereotypes (Connell & Messerschmidt, 2005), pain relief strategies characterised by aggression, dominance, and violence were seen as more permissible for men than women. Beyond these emotions, men were expected to be stoical, in and out of pain. Conversely, in line with feminine stereotypes (Spence & Helmreich, 1979), women were expected and encouraged to share their feelings, including any mental and/or physical health struggles, in their search for pain relief.

Hitting or breaking something to help to relieve pain was considered socially acceptable for men by several participants. 'Nina' attributes this to fundamental male biology, saying:

"Because men have higher testosterone therefore are perceived to be more *angry* and more violent, and therefore you'd *expect* them to hit or break something, when they're in pain".

Grounding this expectation in sex hormones suggests that this is a natural behaviour for a man, not a woman. 'Donna' also expected men to be angry, and it is this anger that she felt made ranting an acceptable form of pain relief for men, because:

"It's an attempt at demonstrating some sort of dominance over whatever the problem is, you're not asking for *help*, you're saying you're angry about what's happening to you, so you're at least *trying* to dominate it".

Here 'Donna' clearly emphasises that rather than asking for help for the pain, it is more acceptable to use strategies which might foster a sense of control over the pain. However, this desire for control seems to be applicable to men only, as aggressive and violent responses to pain were considered unacceptable for women, as explained by 'Maria':

"Ranting's classed as aggressive, and, but you know, every female has a bit of a rant, but, I think, if they start going off the rails of ranting, then it's classed as, you know, being aggressive, *violent*, and, you know, it's not *female*-like, I spose… cos it's more, *masculine*, really, and I think, people find it less attractive".

'Maria' recognises that although ranting may be common for women, the point at which it becomes violent and aggressive is the point at which it becomes "masculine", and therefore unacceptable for women. She also refers to the expectation that women will remain ladylike, and concerned with appearing attractive to others, even when in pain. This extract poses an interesting contrast to Nina's words, as Maria suggests that women are indeed capable of aggression and violence despite their typically lower testosterone levels, but it is the social expectation that women will be calm and ladylike which prevents them from behaving in this way.

Anger and aggression aside, it seems as though other forms of emotional expression are acceptable for women only. This includes expressing one's feelings to healthcare professionals, particularly concerning the psychological experience of pain. For example, 'Josh' sees seeking counselling and taking antidepressants as more acceptable pain relief strategies for women than men because:

"Society thinks that women are more chatty about their *feelings* and stuff like that, and counselling's that type of thing, and you'd *have* to talk about your feelings to your GP in order to get the antidepressants".

Whilst 'Josh' comments on the social expectation that women are able to discuss their feelings with others, there is also the implicit indication that men are not able to do this. 'Dawn' reflects on the broader consequences of this stereotype by saying that:

"As a society we don't encourage men to talk, like we do the same with women, and I think potentially that could be the reason that the suicide rate among *men* for example, particularly men who are younger, is much more high than women, cos men aren't encouraged to talk, and get advice in the same way, as women".

'Dawn' recognises that men are discouraged from expressing their emotions and seeking help across a range of domains, including pain. Male responses to pain are situated in a larger problem in which men are taking their own lives as a result of the socialisation which prohibits them from talking about their struggles. Taken together, it seems that the broader social expectations surrounding male and female emotional expression also apply to pain contexts and may influence men and women's choice of pain relief.

Pain-induced loss of power and ways to regain it. Another way in which broader gender stereotypes seemed to influence the social acceptability of different ways of relieving pain concerns the power dynamics between men and women in Western cultures. In patriarchal cultures where there is a gender hierarchy, men hold more power than women, and this power is often established and maintained through demonstrations of masculinity (Vandello & Bosson, 2013). As has been mentioned, strength and stoicism are considered key aspects of masculinity as we currently know it. As such, several participants felt that any strategy which could reveal that a man is in pain risks posing a threat to his masculinity. This is best demonstrated by 'Sophie', who interprets strength as forbearance. She says:

"A perseverance of pain, an ability to overcome pain, showing strength, is the key tenets of masculinity… and therefore if you are actually recognising that that's not the case, 'I can't deal with this', then you are already, you're saying you're, you've *dented* that masculinity, that it's, it's not quite as *potent* as it was before."

This extract suggests that a potential threat to masculinity is inherent in any form of pain relief, which in itself signals a lack of strength to endure pain. For several participants, pain relief strategies which exposed any psychological struggles, such as seeking counselling and

taking antidepressants, posed the greatest threat to masculinity for this reason. For example, 'Marsha' says:

> "Men, I feel are supposed to have this demeanour of being *tough* and *strong* and *not showing emotion*, so I don't think, taking antidepressants, that's seen as a weakness, they're not being *masculine*, they're not being able to cope".

The reason by which these are considered the most weakening is also a gendered one; the idea that to struggle psychologically is seen as an inherently female problem. For example, 'Craig' says:

> "Mental issues with men is definitely, *ignored more*, and it's more, of a, erm… it's more of a female thing, to have mental issues".

Notably, 'Craig' is not saying that men do not *experience* "mental issues", but that these are "ignored" by society. Moreover, the idea that it is "female" to suffer is not limited to psychological suffering; suffering physically is also considered a female tendency. According to 'Marsha', this stems from the greater experience of pain, as with dysmenorrhea:

> "With women it's sort of seen as acceptable to sort of, be in pain, because women have things like periods and stuff like that, and… cramps and things like that, but that's sort of seen as 'oh that's a feminine thing to sort of, be suffering'."

This association between women and psychological issues starts to explain why the 'weakness' that pain can ascribe to men is so problematic. Loss of masculinity can indicate loss of status as a man and thus, a loss of power (Connell & Messerschmidt, 2005). 'Darren' reflects on how even touching or clutching the sore area can reveal weakness:

> "If we get, seen just holding our arms like this, you know, or that, it's, we kind of get looked down on, or looked at as *weak*, you know, even if we're in agony, we're er, we're still supposed to not really show the pain of something… you're in pain, deal with it, you know, *man up*, and *suck* it up".

Here, 'Darren' also refers to popular parlance in 21st Century Britain by using the term "man up" (Wells, 2015). Terms such as this have emerged to reinforce the gender hierarchy by serving a reminder that men ought to be strong and stoic. If a man is instructed to "man up", it suggests he is not currently 'being a man' and is therefore by default being a woman, which in the gender hierarchy is a less desirable state (Berdahl, 2007).

In a culture where the experience of pain can threaten masculinity, pain relief becomes not just a way to try to end the unpleasant and distressing experience, but a way for men to regain

the power lost as a result of their pain. Beyond attempting to demonstrate endurance by simply ignoring the pain, removing the pain as quickly and easily as possible seemed to be the next best approach to minimise the loss of masculinity, according to some participants. 'Sophie' explains why she felt taking over-the-counter painkillers would be socially acceptable for a man for this reason:

"So the over-the-counter one I was like *paracetamol, ibuprofen,* something like that, you're like 'right, that'll help me get better, I can do that quickly, no one will think much about it, I could be getting it for my wife's period pains, I could be doing anything, just grab it and go, take it', part of the, like, ignoring and managing it myself, and pain will go away."

'Sally' perceives a similar 'quick fix' attitude towards medication for men, specifically in comparison to psychological therapy as an approach to relieving pain:

"It's that sort of, um… 'there's something wrong with me' rather than 'it's everybody else's fault'… that's that kind of, I just think men are like… I presume people sort of see men, like that, they probably want a quick fix, rather than, counselling means really working at something."

Quick fix strategies may minimise any threat to masculinity by returning the man to a non-pain state as quickly as possible. Alternatively, the threat to masculinity can be minimised or even compensated for by using pain relief strategies with sporting connotations. Strategies such as getting a sports massage and applying ice to the area in pain were considered acceptable due to their sporting connotations. In explaining why getting a sports massage would be acceptable for a man, 'Dawn' said:

'Dawn': "I guess because it's more *manly*, and we expect men to play sport, and you got injured so you're a *hero* cos you did it on the sports pitch, and that's okay"

Interviewer: "So, in a sense, in that context, if the man's in pain, it's more of a *positive* reaction than a negative one?"

'Dawn': "Yeah, cos he's kind of pushed himself, and got injured, and did it for the team"

Moreover, pain relief strategies with sporting connotations were thought to be acceptable for a man even if sport was not the cause of the pain. 'Donna' explains:

'Donna': "If a man has ice on something that he says is sore, he *looks* like a sporting hero"

Interviewer: "I see… even if it was unrelated to sport?"

'Donna': "Yes [laughs], exactly"

One interpretation of this may be linked to social capital and the idea that demonstrating competence in one domain of masculinity (e.g. playing sport, exerting oneself physically) can compensate for lacking masculinity in another domain (e.g. being in pain) (De Visser & McDonnell, 2013; De Visser, Smith, & McDonnell, 2009). As such, the positive male connotations of sport may bolster one's feelings of manliness, thus reducing any perceived challenge or threat to masculinity.

Cumulatively, these extracts provide evidence that pain can pose a threat to masculinity, namely through indicating not only a lack of strength but also the presence of weakness. This weakness is associated with femininity, which is problematic due to the gender hierarchy in Western cultures. Responses to pain, including ways of relieving pain, provide an opportunity to minimise this threat and protect and/or restore the masculinity of men in pain.

2) Effectiveness of Pain Relief Strategies

In this theme participants referred to ungendered factors influencing the social acceptability of different ways of relieving pain; namely, what determines a 'normal' response to pain in the absence of any gender constraints. In this theme, 'normal' and 'effective' seem to be closely intertwined, based on the assumption that a pain relief strategy would become typically and frequently used to treat pain *because* it is effective in doing so. This reasoning is embedded in Craig's explanation for why he judged analgesics to be the most acceptable way of relieving pain:

"If it is just, like a physical pain, erm, obviously, *most* people's responses, just take a painkiller, and then if, if that obviously doesn't help it, then, you know it's something that should be seen to, if it's just a headache and the painkiller gets rid of it and it's gone, then, there's no point wasting the doctors or healthcare services if, if it's just gone from a painkiller".

In this extract, taking a "painkiller" is considered the most effective way of relieving pain because of the expectation that the pain would be removed as a result of doing so. It is also perceived to be common as 'Craig' believes it would be "most people's response", presumably for this reason. Consulting a professional such as a general practitioner (GP) was also considered to be a normative response by many participants. For example, 'Darren' said:

"It's your first port of call really… yeah, first port of call ring visit your GP, if your GP's not open ring 111 and find out if it's serious enough to go up to the A&E, or, they send a doctor out, you know, it's the most practical, least *hassle* way"

Similarly, 'Sarah' said:

"That's not weird behaviour at all, that's just, 'oh, you went to speak to someone, because something's wrong, what's wrong?', 'I'm in pain', 'okay!', simple, I just don't see the problem in that."

In this extract, the normality is particularly highlighted by the way 'Darren' and 'Sarah' consider it to be a "practical" and "simple" response to pain, one which would not be questioned or judged. Questions and judgement seem to be implicated in perceptions of non-normative pain relief, and why they might be considered less socially acceptable. Considering more alternative pain relief strategies, such as meditation and yoga, 'Dawn' says it's:

"not so much about the particular thing that they were doing [meditation or yoga] not being acceptable, just in general, but it would be perceived as *weird* or *odd*, or, not something that you expect [to relieve pain]".

This suggests that there are some behaviours which would generally be considered acceptable, but not as forms of pain relief due to a perceived lack of analgesic efficacy. Across several participants there seemed to be a commonly shared belief of which strategies are effective in relieving pain and which are not, in turn influencing their social acceptability as a form of pain relief. This lack of perceived analgesic efficacy also led 'Mike' to consider hypnosis unacceptable, saying:

"I think there is a… view amongst quite a *high* proportion of the population that hypnosis is, a bit 'mumbo jumbo', erm, and… something that you, that is not a *reliable* or a, erm… a *strong* way of achieving a result [pain relief]".

Mike's words again emphasise how normality and effectiveness can be interwoven in relation to pain relief, suggesting that because so many people consider hypnosis to be ineffective as a form of pain relief, it cannot be normal and, ergo, cannot be acceptable. In fact, 'Jack' considers strategies such as hypnosis to be "risky" because they do not guarantee pain relief, saying that:

"A lot of them, the people I know, would just kind of go with, oh the most effective option [for relieving pain], rather than going for like the *riskier*, like acupuncture or yoga, or hypnosis".

This reasoning is also present in Dan's explanation of why other alternative therapies might not be seen as effective forms of pain relief:

"Some of these, the liver oil, biofeedback, acupuncture, TENS and things, um… they seem more like *self-medication* and they, seem more like, um, things that people might be sceptical of the general efficacy of".

The fact that 'Dan' specifically highlights that these can be self-medicated, and that this may detract from the perceived analgesic efficacy, alludes to the importance of expertise in pain management decisions. In some cases, the perceived analgesic efficacy of the strategy depended on the degree of expertise involved. For example, 'Nina' stated:

> "Obviously there are types of pain that are *only* going to happen to females, and *only* going to happen to males, at which point you're *not* going to ask the other gender about that pain, cos that would be kind of *silly*, and potentially not useful, unless they're a doctor".

Similarly, 'Fleur' considered a sports massage as more acceptable than a massage from a partner because of the training a sports masseuse undergoes, saying it's:

> "more *professional*, so it's more *serious*, whereas a massage from a partner, I mean, the partner's not, for example, really good at giving massages… like you get a massage even if everything was okay and I'm not sure it would actually do anything for the pain".

This suggests that the perceived analgesic efficacy required by some to determine social acceptability is informed by expertise. As a result, certain pain relief strategies may be considered acceptable if informed by someone who has sufficient expertise to advise on the matter, be that the result of personal experience, or of professional training.

Taken together, this theme highlights the ungendered factors which can influence the social acceptability of different ways of relieving pain. Acceptability can be determined by perceived effectiveness, sometimes as a result of the expertise and knowledge incorporated into the strategy. This effectiveness is closely linked to what is considered 'normal' in the absence of any gender norms and expectations, with the most acceptable form of pain relief being that which will effectively relieve the pain.

3) **The Sociocultural Context of Pain**

The previous themes highlight the gendered and ungendered factors which might influence the social acceptability of men and women using different forms of pain relief. The third theme acknowledges the source of these factors; the social and cultural influences which inform these rules and norms. Whilst perceptions of what is expected, normal, and/or acceptable may differ from person to person, the same processes were recognised as underlying these ideas. These processes form the following subthemes: *'social consequences of norm violation'* and *'an ever-changing landscape'*.

Social consequences of norm violation. As with other social norms, pain relief norms seem to be governed by the threat of punishment if violated. Most participants reflected on this punishment in the form of other people making negative judgements about the person. For example, when considering men using meditation to relieve their pain, 'Victoria' said:

"They'd be *laughed* at, or *ridiculed*".

And although having an orgasm or thinking about sex can be analgesic, 'Craig' acknowledged the labels a woman might face if she tried to relieve pain this way, saying:

"There's always a lot of negative stuff I think, about females thinking about sex, and if they think about sex, they're apparently a 'slut', but if they don't, then they're a 'prude'."

Although men and women both face judgement for norm violations, participants more readily reflected on the judgements made about a man using typically 'feminine' pain relief strategies. 'Sophie' judged that a man who used aromatherapy to help to relieve his pain would be labelled:

"Soft, effeminate, sexuality questioned, strength of character but also strength of, kind of, manhood".

Whilst 'Sophie' reflected on the judgements that might be made about the man's personality and characteristics, 'Dale' considered the man's social status, and how a man would not even consider doing yoga to relieve pain lest he risk jeopardizing this:

"Just laughing, mocking… I would say yoga is not something, that [men] would openly, probably wouldn't even *contemplate* doing, it becomes kind of *unthinkable… o*n the one level there's the potential for ostracisation, I guess, but also, say, not as far as that there's, um, you're just, your kind of position in the group, is being, at least temporarily eroded or challenged".

Although 'Dale' mentioned ostracization and one's status within a social group being challenged, he does not explicitly state the composition of the group, although some may infer only all-male groups would harbour such dynamics. 'Harry' makes explicit reference to other males as the source of these judgements, saying:

"I'm not really in one of those groups where there's a lot of lads who make fun of one another, but if they *were*, then there's probably stuff here that they wouldn't tell them, because they know they'd get made fun of".

Of importance in both Dale and Harry's extracts is the notion of secrecy to protect one's social status. 'Dale' suggests that any male contemplation of yoga for pain relief would not

be public and "open", whilst 'Harry' acknowledges that if a man felt his position in an all-male group could be threatened by discussing his pain and pain relief, he would consciously not share this with the group to avoid the negative social consequences. This reminds us that judgement can only arise from other people being *aware* of what one is doing to relieve their pain. Many participants recognised this and emphasised the importance of the public visibility of each pain relief strategy. It seemed as though the more visible a behaviour is, the more likely one might receive negative social reactions and judgement for it. It was the visible nature of taking painkillers that led 'Maria' to conclude that it may not be the most socially acceptable strategy based on the reactions and judgements of others:

> "Taking like, I dunno, tablets or whatever, it's more *visible* I think, and I think that's when people start getting more negative about it… I think some people are a bit like 'hmm, why you taking tablets?', cos it's just a bit more *visual*, I spose".

'Dan' shared a similar view, suggesting how social reactions might discourage people from using non-normative forms of pain relief:

> "If it's something that is much more obvious that you're doing it, and maybe you expect that other people would question *why* you're doing it, or how much help it's actually going to provide, then you'd be less likely to do it, I think".

This clearly highlights how expectations of negative social reactions and judgements might influence how one chooses to use pain relief. This applies to both 'traditional' and also 'alternative' approaches to pain relief, as it seems that people may make negative judgements about and have negative reactions to almost any way of relieving pain.

An ever-changing landscape. Participants acknowledged that norms are not fixed and that what is considered socially acceptable can change over time. For example, 'Donna' noted that biofeedback and electrical stimulation devices such as TENS machines are becoming more acceptable:

> "To some extent we've got into *gadgets* and things, I mean, I've got a FitBit on my wrist here, so, um, it's something I think is, *getting* more common, um, but certainly, even five years ago it will probably have been further down the list, and regarded as a bit *weird*".

Use of the term "weird" here raises the question as to whether some of the more 'alternative' strategies considered "weird" in the second theme may, in time, become more acceptable. In fact, many participants commented on how some of the more normative strategies are becoming less socially acceptable due to the idea that the UK's National Healthcare Service

(NHS) is in 'crisis'. This perception is occurring as a result of an increased workload for medical staff working for the NHS which has not been matched by increased funding or resources, leaving staff overworked and underpaid (Baird, Charles, Honeyman, Maguire, & Das, 2016). It seems that this is discouraging individuals from seeking help in more traditionally effective ways, as several participants reflected on the current social climate and the pressure to not use the resource-limited service. As 'Donna' says:

"The health services are *massively* overloaded at the moment, and there's, at least in *my* experience, quite a bit of *hostility*, in that if people don't come in for something that is very serious, then they're, um, made to feel unwelcome".

This hostility seems especially salient for hospitals, rather than general practitioners (GP), as 'Victoria' explains:

"It's *very* much anchored by the current context, if you would have asked me to do this five years ago I probably would have put them very differently… I think, when people think of the NHS crisis, they think of hospitals, I *don't* think they think of the GP surgeries, erm… so I think people are still very willing to see their GP".

'Dan' shared this view, reflecting specifically on how media portrays of Accident and Emergency (A&E) departments at hospitals may influence how people use these services:

"Some of the stuff that I've been reading recently is, just in the news about how, um, overstretched A&E departments in particular are in this country, um… the way I suppose it's been presented in the news is people thinking of it as a waste of money… um… so I think that the perception now is… 'don't go to A&E unless you're actually bleeding out'… um, because otherwise you're just, an idiot drunk, basically".

Use of the term "bleeding out" really highlights the crisis and the level of severity required to justify using healthcare services, especially A&E, at this time. This is an excellent example of an issue specific to this culture at this time which might affect the social acceptability of how men and women seek to relieve their pain. Participants reflected on how things have not always been this way, and indeed may not be this way in future. According to several participants, even a period as short as five years is enough to change a norm and the social rules surrounding it. Not only will pain relief norms most likely continue to change over time, so may the sociocultural factors influencing the norms, as well as the reactions and the judgements people make.

Discussion

The aim of this study was to identify factors influencing the social acceptability of men and women using different methods of pain relief, as well as the perceived consequences of violating these norms. The results present three overarching themes, demonstrating the complexity of factors influencing the social acceptability of using pain relief.

The first theme, '**gender norms applied to pain contexts'**, tells us that many wider gender norms and stereotypes indeed apply to using pain relief. The data support other studies which have established connections between gender and pain in the form of masculine aggression (Reidy, Dimmick, MacDonald, & Zeichner, 2009), female help-seeking (Keogh & Eccleston, 2006; Unruh et al., 1999), male stoicism and suicide (Chioqueta & Stiles, 2007; Granato, Smith, & Selwyn, 2015; Handley et al., 2012), and masculine barriers to help seeking (Addis & Mahalik, 2003; Galdas et al., 2007). The data also suggest that pain relief strategies with sports connotations can minimise the threat that pain can pose to masculinity, providing further support for the idea that some pain behaviours can compensate for perceived loss of masculinity as a result of the pain (Ahlsen, Bondevik, Mengshoel, & Solbrække, 2014; Ahlsen, Mengshoel, & Solbrække, 2012). The other option to regain lost masculinity was to use 'quick fix' strategies to get rid of the pain as quickly as possible. This finding supports the idea that men generally prefer quick fix solutions to their problems (British Psychological Society, 2017) and problem-focused coping strategies (Tamres, Janicki, & Helgeson, 2002). No other compensatory themes emerged, suggesting that when it comes to pain relief, the ways in which a man can compensate for the masculinity lost by expressing pain may be limited.

It is worth highlighting that the focus of this first theme was not intended to be on men and masculinity, but that this is what prominently emerged from the data. Although feminine norms were discussed, masculine norms were more readily and consistently reflected upon in terms of why a range of potentially analgesic behaviours are considered unacceptable for men. The data complement evidence that chronic pain is perceived to make a man less dominant, and more dependent and vulnerable (Bernardes & Lima, 2010), and that the links between gender, pain, and pain relief appear to be more restrictive and problematic for men than women.

This theme can be interpreted in relation to gendered power hierarchies. The social unacceptability of men to behave in 'feminine' ways and the social consequences of doing so are apparent. Many participants reflected on how suffering, both mentally and physically, can

be considered female or feminine. In patriarchal cultures this can be interpreted as being subordinate to men (Bendelow, 2000). Although not referring specifically to gender, Foucault (1998) conceptualised power as shifting and unstable, won and lost on a micro rather than macro level. Such beliefs underpin the theory of precarious manhood (Vandello & Bosson, 2013), suggesting that masculinity, or 'manhood', comes with a sense of power that can be threatened by pain due to exposing weakness and, ergo, femininity implicated in experiencing, expressing, and seeking to relieve pain.

In essence, the endorsement of masculinity and rejection of femininity outlined by participants when reflecting on acceptable pain behaviours for men suggests that pain contexts reinforce the gender hierarchy in Western cultures by encouraging men to maintain or regain their power through their responses to pain. Foucault's work (Foucault, 1998, 2012) can indeed be applied to the results reported here by considering power and discipline in relation to gendered bodies. The cultural practices outlined in this first theme represent forms of social control to produce and maintain bodies and identities in line with the social order, reinforcing dated but pervasive notions of women as naturally inferior as a result of biological deviation from the norm of man (Bailey, 2002). Undeniably, social change is slowly reducing gender inequality (Inglehart, 2008). However, female bodies and practices are still supervised and contained by social control in ways that male bodies are not (King, 2004), and as this theme demonstrates, the "fear and dread of otherness" (King, 2004, p. 36) is still apparent in the expected male avoidance of 'feminine' practices.

The second theme, '**effectiveness of pain relief strategies'** tells us that there are also ungendered social rules guiding perceptions of acceptable pain relief. The contingencies for these norms are less nuanced than for gender norms; they are rooted in what is seen as effective in relieving pain, with relevant expertise informing the strategy. These norms seem to be based on the perceived value of evidence-based practice and the desire for trust when facing illness (Mechanic & Meyer, 2000). The empirical methods underlying treatments established as 'effective' help to foster this trust (Slife & Wendt, 2010) and arguably provide evidence of which strategies will most reliably result in a reduction in pain. Due to the parameters which determine what is or is not considered effective (Reed, McLaughlin, & Newman, 2002), based largely on results of randomised control trials and the expertise involved in designing such interventions, there seems to be less negotiation of what is considered an effective way of relieving pain. Strategies perceived as the most effective tend

to be evidence-based and the most commonly used, making them the most normative ungendered responses to pain.

Throughout the interviews there is the sense that gendered and ungendered pain relief norms are both the product and producers of the social context in which pain occurs, which helped to form the final theme – '**the sociocultural context of pain'**. This theme contextualises the norms outlined in the previous two themes and highlights the importance of sociocultural factors in determining responses to pain. The threat of judgement was particularly salient, and the way participants discussed this threat and the potential consequences of non-conformity further highlighted gender inequality in pain situations. Not only were the examples of male non-conformity deemed less acceptable than female non-conformity, such rules and punishments were considered rather more enforced by other males. This echoes previous research showing that men find it less acceptable for other men to express pain than women (Hobara, 2005; Leung & Chung, 2008; Nayak et al., 2000). This theme highlights a range of sociocultural factors which influence perceptions of 'normal' ways of relieving pain in 21st century Britain, and sheds light on the pressures motivating norm conformity, thus upholding wider beliefs and stereotypes related to pain relief.

Within the third theme, the subtheme '*an ever-changing landscape'* highlighted how perceptions of social acceptability of ways of relieving pain are subject to change. This idea emphasises the historical relevance of ways of relieving pain, and how perceptions of social acceptability reported here are very much rooted in this culture at this time. Again taking a Foucauldian perspective (Foucault, 2002), the norms reflected upon in the second theme may be seen as accepted clinical practices in this culture at this time, based on our current understanding of pain and pain management. The criteria by which a strategy is deemed effective in relieving pain changes with our understanding of pain, and indeed the strategy itself. Moreover, treatments can go in and out of fashion not because of changes in evidence but because of changes to the culture in which they are practiced. For example, many consider the anti-vaccination movement to be the result not of changes in vaccine evidence, but rather activists disseminating disingenuous claims online (Kata, 2012). The ever-intensifying power of the internet and technology are likely to be related to offline discourse about health and self-management more broadly (Powell, Darvell, & Gray, 2003).

Similarly, the factors outlined in the first theme are based on participants' understanding of gender stereotypes in this culture at this time. Whilst certain pain

behaviours have come to be seen by some as gendered, the belief systems on which these are based are changing (Inglehart, 2008). West and Zimmerman (1987) proposed that virtually any behaviour can become gendered, although the process by which this occurs is less clear. Based on the data reported here, we suggest that different pain relief behaviours become gendered if they reflect characteristics of broader gender stereotypes and/or are perceived as typically used by either a man or a woman. This makes their genealogy rather tautological, and difficult to pinpoint an exact origin, but importantly it seems that the origin is social. Indeed, some suggest that undoing such associations, *un*gendering behaviours, will be equally social, requiring marketing and social and traditional media messages to set a precedent of behaviours as fashionable for both men and women, in order to achieve cultural health behaviour change (Snow, 2008).

Another key temporal factor to consider is stigma. Stigma is characterised by negatively highlighting a person as different to others, in a discrediting way (Byrne, 2000). Such stigmatisation is thought to be the result of negative attitudes and prejudice based on a relevant stereotype. Stigma is commonly associated with mental health (Byrne, 2000), and indeed emerged most prominently in the interviews reported here in relation to the psychological experience of pain and psychological ways of seeking to relieve pain. However, stigma also exists in relation to physical health (Schafer & Ferraro, 2011; Sillo et al., 2016). There is also evidence that individuals with chronic pain also face stigma (De Ruddere & Craig, 2016). Stigma is commonly linked to deviation from social norms and stereotypes, and indeed the stigma of violating both gendered and ungendered norms is implicit in the negative social consequences discussed in Theme 3. As stigma and associated stigmatising behaviours are linked to stereotypes, they change *with* said stereotypes. Therefore, not only are gendered and ungendered factors influencing the social acceptability of pain relief subject to change over time, so are the perceived negative social consequences.

Strengths, Limitations, and Future Directions

These results provide a rich understanding of how different ways of relieving pain can be perceived as gendered or ungendered, and the factors which may influence these judgements. In particular, the themes highlight that what is considered an effective way of relieving pain, and what men and women are socially expected to do, are not always the same thing. The results highlight clear barriers presented by masculine norms to men in pain, but

also that there are social rules for women in relation to maintaining femininity when in pain. The emergence of both gendered and ungendered pain relief norms presents a possible goal conflict for the individual in pain; seeking effective pain relief may sometimes clash with conforming to gender norms. For example, a man in pain may recognise that seeking help from an informed professional may be the best way to achieve pain relief but could be reluctant to do so if the desire to conform to masculine norms overrides this. This warrants consideration by healthcare and pain management practitioners, who must acknowledge the sociocultural context surrounding choice and use of pain relief. This will allow them to help patients manage any gender-related barriers to utilising the most effective pain relief possible.

The results are somewhat limited to our homogenous sample, which was largely White, educated, and from the UK. In terms of future directions, it would be interesting to establish whether the factors perceived to influence the social acceptability of pain relief for men and women varies substantially across demographics. It is also possible that perceptions will differ across cultures, but further research is needed to clarify the specific ways in which these might differ. More research is also required to determine how men and women with chronic and acute pain manage situations where the goal of pain relief may conflict with the goal of gender norm conformity, and indeed whether perceived social expectations influence their use of pain relief.

Conclusion

In conclusion, these results highlight that there are multiple sociocultural factors which influence perceptions of what is acceptable for men and women when using pain relief. Gendered and ungendered factors influence what are considered socially acceptable and unacceptable ways for men and women to relieve pain, with recognition that the social rules of pain relief are part of an ever-changing landscape. The social consequences of choosing non-normative pain relief centred largely around negative judgements from others. This was particularly the case for men using ‘feminine’ strategies, perceived as most punishable by other men. In relation to pain relief, masculinity may pose particularly problematic barriers as some of the tenets of masculinity directly conflict with the behaviours deemed most effective in relieving pain. Such barriers can be interpreted as part of broader power structures and gender hierarchies in Western cultures.

Chapter Six: Experimental manipulation of pain relief gender norms

Primary paper
Wratten, S., Eccleston, C., & Keogh, E. (in prep). Experimental manipulation of pain relief gender norms on pain behaviours using cold pressor pain induction.

Background

The Q-sort studies reported in Chapter 4 revealed that people hold different viewpoints concerning the social acceptability of men and women's use of pain relief; some are gendered, whilst others are more ungendered. The interviews reported in Chapter 5 expanded on this by clarifying the ways in which gendered and ungendered pain relief norms influence these different viewpoints, and by highlighting the role of sociocultural factors such as threat of judgement in motivating pain relief norm conformity. Whilst Chapter 3 suggested there were associations between masculinity and internally-focused pain relief strategies and femininity and externally-focused pain relief strategies, Chapters 4 and 5 deepened our understanding of these associations.

Within the predominant stereotype for men (labelled 'conformity to masculine norms') there is additional evidence of a preference for internal strategies such as ignoring the pain. For women, the predominant stereotype (labelled 'normative and effective pain relief for women') reinforces a preference for externally-focused strategies such as taking painkillers and consulting healthcare professionals. Of course, these were not the only stereotypes to emerge, but as the predominant viewpoints they certainly seem to reflect the patterns found in Chapter 3. Moreover, Chapters 4 and 5 further highlight the importance of motivation found in Chapter 3 by exploring more deeply the role of other-related motivation for pain relief, in the form of the threat of negative social judgements and consequences for norm violation.

To reiterate, Chapter 4 revealed that some people's views are in accordance with broader gender stereotypes, but others are rather more ungendered and focused on effectively relieving pain. This raised the question of whether such varying viewpoints might differentially influence how men and women *actually* respond to pain and seek pain relief. In other words, can changing these viewpoints change pain responses? These questions informed the aim of this chapter, which was to investigate the effect of manipulating pain relief norms on subsequent pain relief behaviours.

The aims of this chapter are grounded in social psychological theories of conformity to norms and stereotypes. The way in which norms and stereotypes influence behaviour is thought to be rooted in behavioural contingencies; the conditions which reward some behaviours and punish others (Steele, 2011). Individuals learn how to respond in a given setting based on these rewards and/or punishments. When these contingencies are related to identity (i.e. a setting in which one's identity or characteristics of one's identity matter), what

we know about rewards and punishments guide our behaviours in these settings (Steele, 2011). For example, if a man is in a setting where being 'manly' is relevant, his behaviour will be guided by what he knows about rewards and punishments for masculine behaviours in this setting. Pain contexts are an example in which one's identity might be relevant, as pain can pose a threat to one's gender identity (Ahlsen et al., 2014; Ahlsen et al., 2012; Galdas et al., 2007).

In this chapter I test whether manipulating pain relief norms influences subsequent pain relief behaviours. To optimise the manipulation and control for any extraneous variables, an experimental paradigm was deemed most appropriate. Two studies were conducted; one investigating the effect of feminine norms on women, and one the effect of masculine norms on men. This choice was directly informed by the stereotypes which emerged in Chapter 4, which also explored sex-specific instructions. As such, it is most appropriate to test the effects of these stereotypes on the sex for which they are most relevant. Whilst it would be interesting to see how men respond to feminine stereotypes and vice-versa, the effect is more likely to be strongest when the stereotype is tailored to the sex of the individual (Steele, 2011). In other words, it is better to test the effects of stereotypes on the sex they are ascribed to first, to ensure the design and protocol are effective in eliciting an effect, before using them to try to elicit an effect likely to be much weaker.

Protocol Development

As mentioned above, a controlled laboratory experimental design was preferred to control for any extraneous variables, and to allow for safe pain induction in order to measure actual responses to pain. Safe and uniform pain induction was required to observe any effects of the manipulation on subsequent pain behaviours. Cold pressor pain was chosen as it is considered one of the most safe and reliable methods of pain induction (von Baeyer, Piira, Chambers, Trapanotto, & Zeltzer, 2005), and in this instance is particularly beneficial as it gives participants the autonomy to instantly end the pain experience themselves by removing their hand from the water. Alternative methods of pain induction such as pressure pain and heat pain do not allow participants to instantly terminate their pain, but instead require them to verbally ask the experimenter to end the pain induction on their behalf. Consideration was given to the various ways in which pain relief could be measured, and it was decided that pain tolerance (the moment at which a participant removes their hand from the cold water)

could serve as a proxy for pain relief given the limited ways of measuring this response in a laboratory environment.

In order to design the protocol for these two experimental, laboratory-based studies, a brief review of the literature was conducted to inform the best way to experimentally manipulate gender factors in pain-based laboratory studies. One way of doing this is through priming, which involves presenting subtle cues to an individual to activate specific mental concepts (Bargh & Chartrand, 2000). Abetkoff, Karlsson, and Chiou (2015) studied the effects of gender priming in the form of exposure to 'masculine' energy drinks compared to 'gender neutral' bottles of water. Energy drinks can be considered gendered based on their marketing; often making reference to extreme sports, which are implicitly linked to masculinity and risk taking, and energy drink companies often sponsor high-profile sports events and own sports teams (Miller, 2008). The effectiveness of this gendered advertising is demonstrated by Miller (2008), who found that not only was energy drink consumption significantly higher in men than women, but that energy drink consumption was also positively associated with a typically masculine 'jock' identity; a relationship which is mediated by both risk-taking and conformity to masculine norms. Whilst Abetkoff et al. (2015) found no difference in pressure pain threshold, they found greater pressure pain tolerance in the energy drink condition. They also found that conformity to masculine norms was greater in those in the energy drinks condition, and that this conformity fully mediated the relationship between priming condition and pain tolerance. Therefore, this study suggests that subtle, stereotype-activating cues can change pain responses.

Also using a priming paradigm, Fowler et al. (2011) found an interactive influence of sex and gender on pain experience, with men primed with a feminine gender role reporting lower pain sensitivity and anxiety compared to women in the same condition. It was only in this feminine prime condition that sex differences in reports of pain and anxiety emerged, which the authors attributed to cognitive dissonance (Festinger, 1957). As masculine stereotypes and expectations are more directly relevant to pain than feminine stereotypes and expectations, it is thought that the presence of a feminine cue may have generated psychological discomfort. In order to reduce this discomfort, amplified responses may have been elicited in order to reaffirm one's masculinity.

Using the same method as Fowler et al. (2011), Pronina and Rule (2014) studied the effect of gender priming on subsequent ratings of others' pain. They found that a masculine prime did indeed evoke more 'masculine' behaviours in the form of judging an individual in a high level of pain as less distressed compared to those primed with a feminine or neutral

prime. This is seen as a masculine behaviour as men are considered less cognizant of the pain of others as a result of different social models (Koutantji et al., 1998).

Another way in which gender has been manipulated in pain situations is through gender-related task feedback. Berke, Reidy, Miller, and Zeichner (2016) were interested in whether causing a gender discrepancy through gender-threatening feedback would cause males to engage in stereotypically masculine behaviour. Their sample completed a 'gender knowledge test' which, regardless of performance, provided masculinity-threatening feedback (told they were ranked in the 27th percentile compared to other men) or non-threatening feedback (told they were ranked in the 73rd percentile compared to other men). The authors found that men who received gender-threatening feedback endured significantly more pain than those who received non-threatening feedback, and the authors interpreted this to indicate a socially-expressive function of pain tolerance, namely appearing tough and thus demonstrating masculinity. Additionally, males in the gender-threatening feedback condition exhibited more aggression-related emotional activation than did those exposed to non-threatening feedback. Taken together, these results suggest that threats to a man's masculinity may elicit aggression-related emotions and cognitions which prepare them to inhibit pain expression and improve pain tolerance in order to re-establish masculinity. However, this may not be effective, as Berke and colleagues found that self-perceived masculinity was not reaffirmed following pain endurance.

The findings of Fowler et al. (2011) and Berke et al. (2016) support Precarious Manhood Theory, which states that 'manliness' is a temporary achievement which is easily lost or revoked, therefore men must continuously 'prove' their masculinity through public displays of manliness (Vandello & Bosson, 2013). This is especially the case when a man perceives his masculinity to be challenged, causing him to behave in a stereotypically masculine way in order to reaffirm his masculinity. There is debate as to whether precarious womanhood exists and whether it is 'more' precarious than manhood (Chrisler, 2013), with Addis and Schwab (2013) discussing the inherent problems with comparing the sexes in this way, and instead recommending researchers investigate the precariousness of gender generally; for both men and women. As such, the following two studies will separately study the effects of masculine stereotypes on men's pain behaviours and feminine stereotypes on women's pain behaviours.

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Statement from candidate	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature.								
Signed				**Date**		12/03/2019			

“Experimental manipulation of pain relief gender norms on pain behaviours using cold pressor pain induction”

Abstract

It is increasingly recognised that responses to pain may be influenced by social factors, including gender stereotypes. There is evidence that subtle cues related to gender can influence responses to pain, however it has yet to be shown whether this extends beyond pain expression and to ways of relieving pain. Two experiments reported here aimed to test how exposure to gendered and ungendered pain relief norms, framed as part of a ‘learning and recall task’, affected male and female responses to cold pressor pain. We were primarily interested in pain tolerance and intentions to take an analgesic and consult a healthcare professional, but also explored effects on pain threshold, intensity, and anxiety. We also tested whether conformity to gender norms moderated any of these effects. Study 1 explored female responses to feminine and ungendered, conventional pain relief norms. The results found that conformity to feminine norms moderated a relationship between experimental condition and pain threshold, but only when conformity to feminine norms was low. Specifically, women who reported low feminine norm conformity demonstrated an increased pain threshold in the ungendered condition compared to the control condition. Study 2 explored male responses to masculine and ungendered, conventional pain relief norms. Whilst no direct or moderation effects emerged, there was a negative correlation between conformity to masculine norms and intention to take a painkiller. These results have implications for testing psychosocial processes such as gender norm conformity in controlled laboratory settings, whilst also extending our understanding of gendered pain behaviour.

Keywords: *gender norms, pain induction, pain relief*

Introduction

Sex differences in pain are frequently reported, for example women report pain more frequently and of a higher intensity than men (Fillingim et al., 2009). Whilst biological explanations have been proposed (Melchior et al., 2016), psychosocial factors also play a role in explaining such sex differences, including gendered expectations of how men and women should experience and respond to pain.

In Western societies, men are encouraged to show masculinity through strength, stoicism, and independence, whilst women are encouraged to show femininity through being expressive and nurturing, sensitive and relational (West & Zimmerman, 1987). Behaviours associated with these characteristics are known as gender norms. Gender norms are thought to influence a range of behaviours, including pain behaviours, often automatically (Ferguson & Bargh, 2004). Social norms such as gender norms are learnt explicitly or implicitly through social interactions, as are the sanctions for deviating from the norm (Cialdini & Trost, 1998). The desire to uphold a social identity can influence one's behaviour (Tajfel & Turner, 1986), particularly when that social identity is an important aspect of their overall identity (Christensen, Rothgerber, Wood, & Matz, 2004). For example, gender norms may guide responses to pain in men and women whose gender is an important part of their identity, even at the potential expense of their health.

The experimental pain literature supports some of the stereotypes regarding male and female responses to pain, for example men generally tolerate cold pressor pain for longer than women, and women report higher pain intensity than men (Fillingim et al., 2009). However, gender-based expectations for pain tolerance can also be manipulated to alter actual pain behaviour (Robinson, Gagnon, Riley, & Price, 2003). Moreover, a growing body of literature highlights the various ways in which the relationships between gender and pain behaviours can be experimentally manipulated. For example, priming men with a feminine gender role can reduce pain sensitivity (Fowler et al., 2011), and masculine primes can lead to lower pain distress ratings in others (Pronina and Rule, 2014). There is also evidence that priming men with 'masculine' energy drinks can increase pressure pain tolerance (Abetkoff et al., 2015), as can providing men with gender-threatening feedback (Berke et al., 2016).

A recent study (Wratten, Eccleston, & Keogh, 2019) found evidence of different stereotypes for how men and women are expected to respond to pain and use pain relief.

Results showed that some perceive it as socially acceptable for men and women to use conventional pain relief strategies, whilst others believed it was more socially acceptable to conform to gender norms. For men, this was characterised by ignoring the pain and hoping it would go away, as well as other typically 'masculine' behaviours such as swearing and drinking a beer. For women, this involved hugging someone and asking a female friend or relative for advice as preferable to utilising healthcare services. A recent systematic review supports these findings, compiling evidence that male pain coping strategies often involve ignoring the pain, distancing themselves from the pain, and hiding their pain from others as a result, whereas women in pain often struggle for legitimacy and appropriate treatment, thus influencing their choice of coping strategies (Samulowitz et al., 2018).

The emergence of these stereotypes raised the question of whether pain relief behaviours, such as taking an analgesic or consulting a healthcare professional, can be changed by changing gender expectations. This was the aim of the two studies reported here, which build upon and extend existing gender priming literature to focus specifically on gender norms and pain relief. The two studies reported here investigate how manipulating pain relief gender norms affects responses to pain, using the different norms reported by Wratten et al. (2019). The first tests women's responses to different female norms, which included a stereotypically feminine norm and a more ungendered norm based on effective pain relief. The second study tests men's responses to different male norms, including a stereotypically masculine norm and an ungendered, effective pain relief norm. We tested men and women's responses to sex-specific, congruent norms as it was predicted that these effects would be stronger than manipulating opposite-sex gender norms.

We predicted that women and men would differentially tolerate pain and intend to take a painkiller and to consult a healthcare professional in line with the norms presented to them during a priming task, based on evidence that contextual changes can alter conformity to social norms (Pool et al., 2007). We also tested whether gender norm conformity moderates this effect (Christensen et al., 2004), as we predicted the priming manipulation might only be effective in participants who strongly conformed to gender norms.

Method

Study 1: Female Responses to Female Pain Relief Norms

Design

A between-participants design with 3 conditions was used. The manipulation across conditions was that participants read different (bogus) research summaries in which different norms were conveyed. There were two experimental conditions, each documenting a different pain relief norm for women, and a control condition documenting norms about older adults using technology. As our interest was primarily in behaviours related to pain relief, there were three dependent variables of primary interest: pain tolerance, intention to take a painkiller, and intention to consult a healthcare professional. Of secondary interest were three other dependent variables: pain threshold, pain intensity, and pain anxiety. Conformity to feminine norms was measured as a potentially moderating variable.

Participants

Based on a power analysis for medium effect sizes, a total of 150 adult women aged 18 to 72 (M = 23.73 years, SD = 8.35 years) were recruited using on-campus and town-based posters, emails, and word-of-mouth, as well as an undergraduate research participation scheme at the University of Bath. Participants were generally heterosexual (92%), British (60.7%) students (84%), although participants spanned 27 nationalities and 14 different occupations. Condition allocation was determined using a random number generator. Participants were pain-free, not taking any medication (excluding contraceptive pill), and did not report any skin complaints, heart complaints, or allergies.

Pain induction task

The cold-pressor task was selected as the method of pain induction as it is considered safe and valid (von Baeyer et al., 2005). The cold water bath was maintained between 1- 5℃ using a Techne thermoregulator and a Dip Cooler (Model: RU-2000) which circulated the water to prevent local warming around the hand to ensure consistency across participants and studies (Mitchell, MacDonald, & Brodie, 2004). Participants placed their non-dominant hand in the cold water and reported the point at which they first experienced a painful sensation (pain threshold) and then removed their hand when they could no longer tolerate the pain

(pain tolerance). Unbeknownst to participants, a two-minute limit was in place, at which point the experimenter asked the participant to remove their hand from the water (Keogh et al., 2000).

Materials

Stimulus development. Three gender norm primes were developed based on the results of Wratten et al. (2019), which found evidence of two stereotypes in relation to women's use of pain relief. The predominant stereotype, 'normative and effective pain relief for women', prescribed it most acceptable for women to use conventional forms of pain relief which were deemed most effective in relieving pain, such as taking a painkiller or consulting a healthcare professional. Conversely, the second stereotype, 'conformity to traditional feminine norms', deemed it most acceptable for women to use everyday behaviours to relieve pain rather than burdening the healthcare services. Everyday behaviours with feminine connotations, such as asking a female friend or relative for advice and hugging someone, were seen as the most acceptable.

We designed different research summaries to portray these viewpoints as 'the norm' for a woman in pain, as well as a 'control' research summary which was similar in style and structure whilst being unrelated to gender or pain. The research summaries can be found in Appendices 6-8. The summaries portray descriptive norms; what most individuals do in a specific setting, regardless of its appropriateness (Christensen et al., 2004). Descriptive norms are thought to influence behaviours based on the heuristic that "what most people do is probably the correct thing to do" (Christensen et al., 2004, pp. 1297). Based on this heuristic, it was predicted that priming participants with a 'norm' of how most people of their sex behave in a pain setting could cause them to conform to this norm when in a pain situation themselves.

It was predicted that women in the 'effective pain response' condition might be more likely to have a lower pain tolerance and a heightened intention to take a painkiller and to consult a healthcare professional than those in the control condition. Conversely, women in the 'feminine pain response' condition might demonstrate a higher pain tolerance and reduced intention to consult a healthcare professional compared to women in the control condition. We also predicted that conformity to feminine norms could moderate these relationships, as

only women who highly conform to feminine norms might change their behaviours to be aligned with 'most women' in a pain situation.

Piloting the stimuli. The bogus research summaries were piloted with 10 men and 17 women to ensure the summaries were similar in terms of interest, ease of understanding, believability, and degree of masculinity, which they were (see Appendix 11). A one-way ANOVA revealed a significant difference in ratings of femininity ($F(2,78) = 9.06$, $p < .001$). As expected, the 'feminine pain response' was rated as significantly more feminine than the control norm ($p < .001$), and the 'effective pain response' was found to be significantly more feminine than the control norm ($p = .015$). There was no significant difference in the rated degree of femininity for the 'feminine pain response' and 'effective pain response' summaries ($p = .389$). Pilot participants were also asked to rate the similarity of the three summaries in terms of length, format, and writing style, with a mean similarity of 8.19 out of 10 ($SD = 1.15$). Together, these findings suggest that the research summaries were valid and suitable for their intended purpose.

Self-report measures. The following self-report measures were administered to all participants following the cold pressor pain task:

Pain intensity and anxiety. Participants were asked to rate the cold pressor pain on an 11-point Likert-style scale ranging from 0 (no pain at all) to 10 (worst pain imaginable), and any anxiety they experienced during the cold pressor task also on an 11-point Likert-style scale ranging from 0 (no anxiety at all) to 10 (anxiety could not be worse).

Likelihood to take a painkiller or visit a healthcare professional. Following the cold pressor task, participants were asked to rate how likely they would be to take a painkiller if they experienced pain as intense as the pain they just felt on a regular basis, using a 7-point Likert-style scale ranging from extremely unlikely (1) to extremely likely (7). They were also asked to rate how likely they would be to visit a healthcare professional if they experienced pain as intense as the pain they just felt on a regular basis, also using a 7-point Likert-style scale ranging from extremely unlikely (1) to extremely likely (7).

Conformity to feminine norms. Conformity to feminine norms was measured using the Conformity to Feminine Norms Inventory-45 (CFNI-45), containing 45 items describing stereotypically feminine behaviours, beliefs, and attitudes (Parent & Moradi, 2011b).

Participants indicated the extent to which they agreed with each statement in relation to their own behaviours, beliefs, and attitudes using a 4-point scale ranging from 0 (strongly disagree) to 3 (strongly agree). Scale means were calculated for each participant, with possible scores ranging from 0 to 3. The scale has high internal reliability in female samples (Parent & Moradi, 2010)

Gendered pain relief strategies scale. Participants also completed a new measure assessing the extent to which a range of pain relief strategies are thought to be typically used by men or women. However, this measure is not relevant to the present analysis and results will be analysed and reported elsewhere.

Procedure

The studies were pre-registered using the AsPredicted preregistration form on Open Science Framework on 9th January 2018 (see Appendix 13). Ethical approval for both studies reported here was granted from the Department of Psychology and Department for Health Ethics Committees, University of Bath, United Kingdom. The same female experimenter (SW) conducted the study with all participants across both studies. Following expression of interest, provision of study information, and participant agreement to take part, informed consent was gained and participants completed a brief demographics questionnaire.

The study began with a 'learning task' in which participants were given two minutes to read a research summary (differing dependent on the condition they were in) with the knowledge they would be asked to recall the information following the pain task. Once the two minutes had passed, participants then took part in the cold pressor task and pain threshold and tolerance were measured. Immediately after this, participants were asked to rate the pain intensity and anxiety experienced during the task, as well as their intention to take a painkiller and seek professional help for the pain. Participants then completed the 'recall task', in which they had to fill in missing words from the research summary they read during the 'learning task'. Participants were then asked to write a sentence or two describing what they thought the aim of the study was (serving as a manipulation check), and then to rate the believability and relevance of the research summary to their own life. Participants were then told the true aim of the study before completing the CFNI-45 and the Gendered pain relief strategies scale. They were told that the research summary they had read was fabricated and asked to

complete the questionnaires based on their everyday thoughts, feelings, and behaviours, to undo any priming effect. Participants were then fully debriefed and provided final consent.

Analytic strategy

First, the self-report scales and cold pressor data were screened following the recommendations of Tabachnick and Fidell (2013). Priming manipulation checks were also conducted, including tests for group differences in believability and relevance ratings. Preliminary ANOVAs were then conducted to test whether the different groups had affected any of the outcomes. Similarly, correlation data between the measures are provided. For the main analyses, a series of moderation tests were conducted with a linear regression framework using PROCESS for SPSS Version 2.10 (Hayes, 2013) to test whether conformity to feminine norms moderated any effects of condition on the pain outcome variables.

Results

Data Screening

Seven participants did not verbally indicate the point at which they experienced the cold water as painful, resulting in 143 pain threshold scores. As pain threshold is not a key outcome, these scores were coded as missing rather than imputed. Six univariate outliers were detected by identifying Z-scores greater than ± 3.29 (Tabachnick & Fidell, 2013). Four of the six were pain threshold scores (3 in the effective group, one in the feminine group), the remaining two were pain intensity scores (one in the effective group, one in the control group). Following the guidance of Tabachnick and Fidell (2013), these outliers were adjusted to be one unit larger or smaller than the next extreme score. No cases had significant Mahalonobis distances suggesting that there were no multivariate outliers.

Following outlier adjustment, the distributions of the variables were checked, revealing that the data for pain threshold, pain tolerance, intention to take painkiller, and intention to consult a healthcare professional were non-normally distributed. Transformations were conducted but did not improve the distribution of intention to take painkiller and intention to consult healthcare professional, so untransformed data for these variables are used, as recommended by Tabachnick and Fidell (2013). Square root transformations improved the distributions of the pain threshold and tolerance variables, so the transformed

variables are used in subsequent analyses. Untransformed means are reported in tables for ease of understanding.

Manipulation Checks

Five participants accurately guessed the true aim of the study. To ensure these five participants had not responded differently as a result of guessing the true aim, *t*-tests were conducted to compare naïve participant scores on the key outcome variables with those who had guessed the true aim. All $p > 0.05$, so the five participants were included in the subsequent analyses.

A one-way ANOVA revealed that there was a significant difference in ratings of believability of the bogus research summaries across groups (feminine vs. effective vs. control), $F(2,147) = 8.81$, $p < .001$. As Levene's test of homogeneity of variance was significant ($p < .001$), a Games-Howell post-hoc test was conducted. Contrary to the pilot testing, this revealed that participants in the feminine condition ($M = 6.36$, $SD = 2.75$) found their research summary significantly less believable than those in the effective ($M = 7.46$, $SD = 1.73$; $p = .049$) and control ($M = 8.12$, $SD = 1.70$; $p < .001$) conditions. Believability of the effective summary and control summary did not significantly differ ($p = .137$).

Relevance of the research summary to the self was also tested using a one-way ANOVA, and again revealed a significant difference across groups, $F(2,147) = 3.19$, $p = .044$. As Levene's test of homogeneity of variance was non-significant ($p = .223$), a Tukey post-hoc test was conducted. Participants in the effective condition ($M = 6.58$, $SD = 1.97$) rated their research summary as significantly more relevant than those in the control condition ($M = 5.40$, $SD = 2.52$; $p = .037$), but the difference in relevance between the effective and feminine ($M = 5.82$, $SD = 2.57$) conditions was not significant ($p = .247$). Participants in the feminine and control conditions were not significantly different in their reports of relevance ($p = .649$).

We expected that the manipulation would only be effective if the research summary was believable, and to a lesser extent, relevant to the participant's life. These findings suggest that participants in the feminine condition found the 'feminine pain response' summary less believable than the other two summaries, and as (ir)relevant to their lives as the control summary. These findings will be discussed further in the discussion, but suggest that we might expect to see significant differences between the effective and control conditions only.

Preliminary ANOVAs Testing Between Group Differences

One-way ANOVAs were initially conducted to test for any priming group differences in the outcomes measured. Means and standard deviations can be found in Table 6.1. Results are divided into primary and secondary outcomes. The primary outcomes are those which most closely represent attempts to remove/relieve the pain. Pain tolerance in this study served as a behavioural measure of removing pain, whilst intentions to take a painkiller and consult a healthcare professional are self-reported measures of intention. Group differences in pain threshold, intensity, and anxiety are explored in the secondary analyses. No group differences in conformity to feminine norms were found ($F(2, 147) = 0.85$, $p = .428$).

Primary outcomes. One-way ANOVAs revealed no significant group differences in pain tolerance ($F(2,147) = 0.26$, $p = .768$), intention to take a painkiller, $F(2,147) = 2.88$, $p = .059$, or intention to consult a healthcare professional, $F(2,147) = 0.70$, $p = .499$.

Secondary outcomes. One-way ANOVAs also revealed that there were no significant group differences in pain threshold ($F(2,140) = 1.26$, $p = .286$), pain intensity ($F(2,147) = 2.28$, $p = .105$), or pain anxiety scores ($F(2,147) = 0.71$, $p = .495$).

Although there were no significant group differences in any of the primary or secondary outcomes, this may be because the manipulation may only have an effect on certain individuals. As we had predicted that the effect might depend on conformity to feminine norms, formal moderation tests were conducted with a linear regression framework using PROCESS for SPSS Version 2.10 to test for group differences including conformity to feminine norms as a moderator.

The first step was to examine the correlations between conformity to feminine norms and the predictor and outcome variables. Due to the number of variables included, these correlations are at risk of Type I errors. As a precaution, a Holms-Bonferroni correction was applied (Gaetano, 2013), as shown in Table 6.2. However, this correction is notoriously conservative, and can lead to Type II errors (Curtin & Schulz, 1998). It should be noted that the following correlations became non-significant following the Holms-Bonferroni correction: the relationship between pain intensity and pain threshold (unadjusted $p = .01$, adjusted $p = .24$), pain anxiety and pain tolerance (unadjusted $p = .02$, adjusted $p = .48$), the dummy coded feminine condition and intention to take a painkiller (unadjusted $p = .03$, adjusted $p = .57$), pain threshold and intention to take a painkiller (unadjusted $p = .003$, adjusted $p = .08$), pain tolerance and intention to take a painkiller (unadjusted $p = .006$,

adjusted $p = .16$), pain tolerance and intention to consult a healthcare professional (unadjusted $p = .003$, adjusted $p = .08$), and the relationship between conformity to feminine norms and intention to take a painkiller (unadjusted $p = .006$, adjusted $p = .16$). It is likely that at least some of these represent Type II errors, but to be cautious, the adjusted correlations shall be presented and discussed.

Table 6.1.
Untransformed Descriptive Statistics for Key Variables in Study 1

		Threshold	Tolerance	Pain intensity	Pain anxiety	Intention to take painkiller	Intention to consult healthcare professional	Conformity to feminine norms
Feminine condition	Mean	17.18	44.94	6.18	2.46	4.72	5.44	1.70
	SD	11.11	30.09	1.75	1.95	2.15	1.73	0.29
Effective condition	Mean	18.33	47.43	6.12	2.92	5.30	5.54	1.76
	SD	15.43	31.10	1.45	2.11	1.78	1.91	0.25
Control condition	Mean	14.60	43.34	6.74	2.90	5.62	5.84	1.72
	SD	11.29	29.63	1.59	2.47	1.75	1.63	0.26
	Mean	16.69	45.24	6.35	2.76	5.21	5.61	1.73
	SD	12.75	30.12	1.61	2.18	1.92	1.76	0.26

Table 6.2.

Holm-Bonferroni Adjusted Correlations between Key Variables in Study 1

	Feminine condition	Effective condition	Threshold	Tolerance	Pain intensity	Pain anxiety	Intention to take painkiller	Intention to consult healthcare professional	Conformity to feminine norms
Feminine condition	1	-.500**	.061	-.005	-.073	-.098	-.182	-.067	-.079
Effective condition	-.500**	1	.072	.054	-.100	.052	.032	-.027	.102
Threshold	.061	.072	1	.552**	-.216	-.088	-.245	-.283*	.100
Tolerance	-.005	.054	.552**	1	-.311**	-.188	-.222	-.242	-.011
Pain intensity	-.073	-.100	-.216	-.311**	1	.388**	.292**	.269*	.130
Pain anxiety	-.098	.052	-.088	-.188	.388**	1	.055	-.037	-.011
Intention to take painkiller	-.182	.032	-.245	-.222	.292**	.055	1	.643**	.225
Intention to consult healthcare professional	-.067	-.027	-.283*	-.242	.269*	-.037	.643**	1	.132
Conformity to feminine norms	-.079	.102	.100	-.011	.130	-.011	.225	.132	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

'Feminine condition' and 'effective condition' refer to the dummy coded variables

Moderation Analyses

The conditional effects of *X* (priming condition) on the primary and secondary outcomes through *M* (conformity to feminine norms) were tested with a linear regression framework using PROCESS for SPSS Version 2.10 (Hayes, 2013). Six tests were conducted; one for each of the outcomes. Priming condition (*X*) was dummy coded. As there were three conditions, two dummy coded variables were created, with the control group as the reference group in each. The analyses were conducted twice, using one dummy variable as the condition (e.g., control vs. feminine), whilst controlling for the other dummy variable (e.g., control vs. effective). Although age could be a potentially confounding variable, it did not significantly correlate ($p > .05$) with any of the key variables and therefore has not been included in the analyses. Bootstrapping was used to respect any irregularity of the sampling distribution by estimating the effects based on 5000 bias-corrected bootstrap samples (Hayes, 2013).The criterion for statistical significance was set at $p < 0.05$ throughout.

The aim of the following analyses was to formally test any moderation effect of conformity to feminine norms. As such, the focal outcome is b^3, which represents the interaction effect; whether the effect of *X* (condition) on *Y* (outcome) depends on *M* (conformity to feminine norms). PROCESS also produces b^1 and b^2 coefficients, although as these are not the focus of these analyses, and because these are considered in the ANOVA tests, the results for these coefficients are presented in Table 6.3. The b^1 coefficient refers to the conditional effect of focal *X* (condition) on *Y* when *M* (conformity to feminine norms) equals zero, which is uninterpretable without mean centering as no participants scored zero on the CFNI-45. The b^2 coefficient refers to the conditional effect of *M* (conformity to feminine norms) on *Y* (outcome) when *X* equals 0. As *X* is dummy coded to focus on one of three conditions, there are also issues interpreting b^1 coefficients.

Mean centering is often recommended to address these issues, however mean centering and standardization cannot be conducted when the independent variable is categorical (Dawson, 2014). As we were most interested in the interaction effect (b^3), which is not affected by these issues (Hayes, 2013), b^3 are reported and interpreted as necessary below, with uncentered b^1 and b^2 coefficients reported in Table 6.3 for interested readers. With evidence that the effect of *X* on *Y* is moderated by *M*, interactions are then probed using the pick-a-point approach and the Johnson-Neyman technique to quantify and describe the contingent effect by estimating the effect of *X* on *Y* at various values of *M*.

Table 6.3.
Study 1 Regression Coefficients (b^1, b^2, and b^3) from PROCESS Moderation Analyses

Predictors	Effect on **Pain tolerance**			Effect on **Intention to take painkiller**			Effect on **Intention to consult healthcare professional**			Effect on **Pain threshold**			Effect on **Pain intensity**			Effect on **Pain anxiety**		
	Coeff.	SE	*p*	Coeff.	SE	*p*	Coeff.	SE	*p*	Coeff.	SE	*p*	Coeff.	SE	*p*	Coeff.	SE	*p*
*b*1 (focal *X* = feminine condition)	-1.75	2.30	0.45	-0.62	2.07	0.77	1.00	1.95	0.61	-1.83	1.50	0.22	-1.08	1.77	0.55	0.99	2.44	0.69
b^2	-0.56	0.83	0.50	1.65	0.75	0.03*	1.20	0.70	0.09	-0.04	0.55	0.94	0.72	0.64	0.26	0.17	0.88	0.85
b^3	1.10	1.33	0.41	-0.15	1.20	0.90	-0.81	1.12	0.47	1.29	0.86	0.14	0.31	1.02	0.76	-0.84	1.41	0.55
b^1 (focal *X* = effective condition)	1.87	2.53	0.46	-3.29	2.26	0.15	-3.76	2.12	0.08	4.20	1.63	0.01**	-0.20	1.95	0.92	-2.48	2.68	0.36
b^2	0.13	0.77	0.86	1.11	0.69	0.11	0.31	0.65	0.63	1.12	0.50	0.03*	0.92	0.59	0.12	-0.58	0.82	0.48
b^3	-0.89	1.42	0.53	1.65	1.28	0.20	1.95	1.20	0.11	-2.19	0.92	0.02*	-0.26	1.10	0.81	1.43	1.51	0.34

b^1 refers to the conditional effect of focal *X* (condition) on *Y* when *M* (conformity to feminine norms) equals zero

b^2 refers to the conditional effect of *M* (conformity to feminine norms) on *Y* (outcome) when *X* equals 0

b^3 represents the interaction effect; whether the effect of *X* (focal condition) on *Y* (outcome) depends on *M* (conformity to feminine norms)

Primary outcomes: predicting pain relief outcomes

Predicting pain tolerance. PROCESS moderation testing found that the regression model comparing the feminine condition to the control condition did not significantly predict pain tolerance, $R^2 = 0.01$, $F(4, 145) = 0.31$, $p = 0.87$, and the b^3 interaction between condition and conformity to feminine norms (see Table 6.3) was also non-significant, R^2 change = 0.005, $F(1, 145) = 0.69$, $p = 0.41$. A similar pattern was found for the model comparing the effective condition to the control condition, $R^2 = 0.01$, $F(4, 145) = 0.24$, $p = 0.92$, R^2 change due to interaction = 0.003, $F(1, 145) = 0.39$, $p = 0.53$. Taken together, these tests suggest that in women, experimental group and conformity to feminine norms were unrelated to pain tolerance.

Predicting intention to take painkillers. The overall regression model with the feminine condition as the focal *X* (comparing the feminine condition to the control condition whilst controlling for the effective condition) was significant in predicting intention to take a painkiller ($R^2 = 0.08$, $F(4, 145) = 3.36$, $p = 0.01$). However, the b^3 interaction between condition and conformity to feminine norms was non-significant (see Table 6.3) and did not significantly improve the model (R^2 change due to interaction = 0.001, $F(1, 145) = 0.02$, $p = 0.90$). The model with the effective condition as the focal *X* (comparing the effective condition to the control condition) was also significant, $R^2 = 0.10$, $F(4, 145) = 3.82$, $p = 0.006$. However, once again the interaction between condition and conformity to feminine norms was non-significant and did not significantly improve the model, R^2 change = 0.01, $F(1, 145) = 1.68$, $p = 0.20$. As such, the predictive power of these models cannot be attributed to the b^3 interactions.

Predicting intention to consult a healthcare professional. For intention to consult a healthcare professional, the PROCESS regression model comparing the feminine condition to the control condition was not significant in predicting intention to consult a healthcare professional ($R^2 = 0.03$, $F(4, 145) = 1.13$, $p = 0.34$), and the interaction between condition and conformity to feminine norms was non-significant (see Table 6.3) and did not significantly improve the model (R^2 change due to interaction = 0.004, $F(1, 145) = 0.52$, $p = 0.47$). The model comparing the effective condition to the control condition was also non-significant ($R^2 = 0.04$, $F(4, 145) = 1.68$, $p = 0.16$), and once again the interaction between condition and conformity to feminine norms was non-significant and did not significantly improve the model, R^2 change = 0.02, $F(1, 145) = 2.66$, $p = 0.11$. Taken together, these tests

suggest that in women, experimental group and conformity to feminine norms were unrelated to intention to consult a healthcare professional.

Secondary outcomes: predicting other pain-related outcomes

Predicting pain threshold. In terms of predicting pain threshold, the PROCESS regression model with the feminine condition as the focal *X* (comparing the feminine condition to the control condition whilst controlling for the effective condition) was not significant in predicting pain threshold (R^2 = 0.04, F(4, 138) = 1.52, p = 0.20). The R^2 increase due to the interaction between condition and conformity to feminine norms was also non-significant, R^2 change = 0.02, F(1, 138) = 2.23, p = 0.14.

The second regression model, this time comparing the effective group to the control group (whilst controlling for the feminine condition) was just short of significance, R^2 = 0.07, F(4, 138) = 2.41, p = 0.052. However, the interaction between condition and conformity to feminine norms was significant, b^3= -2.19, t(138) = -2.39, p = 0.02 and accounted for a significant proportion of the variance in pain threshold (R^2 change = 0.04, F(1, 138) = 5.73, p = 0.02).

In order to facilitate interpretation, the moderation effect can be viewed in Figure 6.1, which suggests a cross-over interaction (Szklo & Nieto, 2014). The pick-a-point approach (Bauer & Curran, 2005) was used to explore this further. Here, the conditional effect of being in the effective group on pain threshold at the 16th, 50th, and 84th percentiles for scores on the CFNI-45 was considered. This approach suggested that this effect was only significant in the 16th percentile (b = .94, t = 2.59, p = .01). To gain a better understanding of where exactly the moderation occurs, the Johnson-Neyman technique (Johnson & Neyman, 1936) was used to partition the data around the exact point at which p = .05 falls, and to highlight the zones of significance within the dataset. This point was at 1.63 on the CFNI-45 (for reference, scores in this sample ranged from 0.80 to 2.47), with 39.86% of the data falling below this point (p < .05), and 60.14% above this point (p > .05). When scoring 1.63 on CFNI, condition and threshold are significantly related, t(138) = 1.98, p = 0.05, b = .62. As scores on the CFNI decrease, the relationship between condition and threshold becomes more significant, with the lowest CFNI score (0.80), b = 2.45, t(138) = 2.68, p = .008.

Taken together, this suggests that the interaction effect between being in the 'effective' condition and conformity to feminine norms only occurs for those low in conformity to feminine norms, as shown in Figure 6.1. This suggests that the effective prime condition increased pain threshold compared to those in the control condition, but only for those who had relatively low conformity to feminine norms. In other words, it seems that presenting a woman who does not typically conform to feminine norms in her everyday life with information suggesting that most women use typically effective ways of relieving pain actually increases her pain threshold.

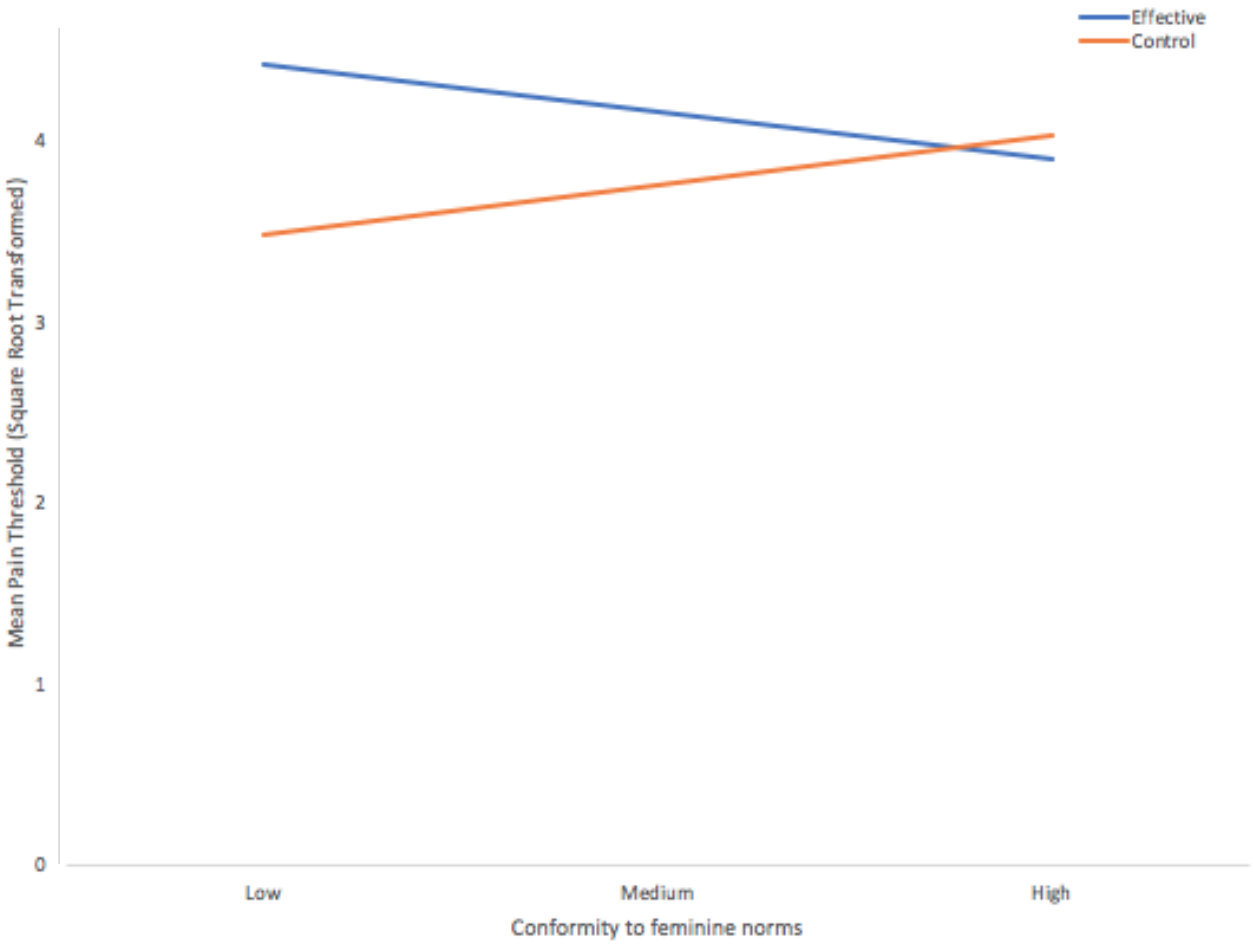

Figure 6.1. Line graph showing interaction effect between condition and low conformity to feminine norms on pain threshold

Predicting pain intensity. Moving on to pain intensity, the PROCESS moderation found that the model comparing the feminine condition to the control condition did not significantly predict pain intensity, $R^2 = 0.05$, $F(4, 145) = 1.89$, $p = 0.12$, and the R^2 increase

due to the interaction between condition and conformity to feminine norms was also non-significant, R^2 change = 0.006, $F(1, 145) = 0.09$, $p = 0.76$. A similar pattern was found for the model comparing the effective condition to the control condition, $R^2 = 0.05$, $F(4, 145) = 1.88$, $p = 0.12$, R^2 change due to interaction = 0.004, $F(1, 145) = 0.06$, $p = 0.81$. Taken together, these tests suggest that in women, experimental group and conformity to feminine norms were unrelated to pain intensity.

Predicting pain anxiety. Finally, PROCESS testing found that the regression model comparing the feminine condition to the control condition was not significant in predicting pain anxiety, ($R^2 = 0.01$, $F(4, 145) = 0.45$, $p = 0.77$), and the interaction between condition and conformity to feminine norms was non-significant (see Table 6.3) did not significantly improve the model (R^2 change due to interaction = 0.002 $F(1, 145) = 0.36$, $p = 0.55$). The model comparing the effective condition to the control condition was also non-significant ($R^2 = 0.02$, $F(4, 145) = 0.59$, $p = 0.67$), and once again the interaction between condition and conformity to feminine norms was non-significant and did not significantly improve the model (R^2 change = 0.006, $F(1, 145) = 0.90$, $p = 0.34$). It seems that as with pain intensity, experimental group and conformity to feminine norms were unrelated to pain anxiety in women.

To summarise, it seems that experimental condition and conformity to feminine norms did not significantly predict pain tolerance and intentions to consult a healthcare professional or take a painkiller. It is worth noting, however, that there may be a positive correlation between conformity to feminine norms and intention to take a painkiller, but that cautious use of the Holm-Bonferroni correction may have led to a type II error. In terms of secondary outcomes, experimental condition and conformity to feminine norms seemed unrelated to self-reported pain anxiety and pain intensity. However, an unexpected finding emerged in relation to pain threshold, with evidence demonstrating a cross-over interaction effect in which participants who are generally low in feminine norm conformity demonstrated an increased pain threshold in the effective condition compared to the control condition. Although most of these findings are non-significant, this may be theoretically unsurprising given masculinity is more closely related to pain than femininity is. Therefore, we conducted a second study to explore the effects of experimental manipulation of pain relief norms on men.

Study 2: Male Responses to Male Pain Relief Norms

Design

As in Study 1, a between-participants design with 3 conditions was used. A similar priming manipulation was used. There were again two experimental prime conditions, but in this study the 'feminine pain response' was replaced by the 'masculine pain response', and the wording of the effective pain response was altered to be specifically tailored to men. The control condition was the same as in Study 1. More information is available in the materials section and in the appendices. The dependent variables were the same as in Study 1, this time with conformity to masculine norms measured as a potentially moderating variable.

Participants

A total of 138 adult men aged 18 to 63 (M= 25.56 years, SD = 7.59) were recruited using the same recruitment methods and inclusion criteria as in Study 1. Forty-seven men were randomly allocated to the masculine condition, 46 to the effective condition, and 45 to the control condition. Participants were generally heterosexual (95%), British (71%) students (77%), although participants spanned 25 nationalities and 27 different occupations.

Pain Induction Task

The same pain induction protocol was used as described in Study 1.

Materials

Stimulus development. As before, the bogus research summaries were developed based on the results of Wratten et al. (2019), who also found two stereotypes relating to men's use of pain relief. The predominant stereotype was labelled 'conformity to traditional masculine norms' and prescribed it most acceptable for men to use typically masculine behaviours to relieve pain, such as ignoring the pain, and 'quick fixes' such as taking a painkiller. The second stereotype was labelled 'normative and effective pain relief for men' as this viewpoint deemed it most acceptable for men to use conventional forms of pain relief. As before, we designed research summaries to portray these viewpoints as 'the norm' for a man in pain. The same control research summary was used as in Study 1. The research summaries can be found in Appendices 8-10.

It was predicted that men in the 'effective pain response' condition might be more likely to have a lower pain tolerance and a heightened intention to take a painkiller and to consult a healthcare professional than those in the control condition. Conversely, men in the 'masculine pain response' condition might demonstrate a higher pain tolerance and reduced intention to consult a healthcare professional compared to men in the control condition. We also predicted that conformity to masculine norms could moderate these relationships, as only men who highly conform to masculine norms might change their behaviours to be aligned with 'most men' in a pain situation.

Piloting the stimuli. We piloted the male research summaries with 15 men and 8 women (different to those included in the Study 1 piloting) to ensure there were no significant differences across the summaries which could influence the manipulation effect. Piloting revealed no difference in interest, ease of understanding, or degree of femininity (see Appendix 12). A one-way ANOVA revealed the three summaries significantly differed in degree of masculinity ($F(2,66) = 10.56$, $p < .001$). The 'masculine pain response' was found to be significantly more masculine than the control norm ($p < .001$) and the 'effective pain response' ($p = 0.015$). There was no significant difference in the rated degree of masculinity for the 'effective pain response' and control summaries ($p = .227$). There were also significant differences in believability ($F(2,66) = 6.60$, $p = .002$). Both the 'masculine pain response' ($p = .002$) and the control norm ($p = .033$) were rated as significantly more believable than the 'effective pain response'. There were no significant differences in the believability of the 'masculine pain response' and control summaries ($p = .614$). Pilot participants were also asked to rate the similarity of the three summaries in terms of length, format, and writing style, with a mean similarity of 7.52 out of 10 ($SD = 1.56$).

Self-report measures. Participants in this study completed the same measures of pain intensity, pain anxiety, likelihood to take a painkiller, and likelihood to consult a healthcare professional as in Study 1. They also completed the Conformity to Masculine Norms Inventory-46 (CMNI-46). The scale contains 46 items describing stereotypically masculine behaviours, beliefs, and attitudes (Parent & Moradi, 2011a). Participants indicated the extent to which they agreed with each statement in relation to their own behaviours, beliefs, and attitudes using a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Parent and Smiler (2013) found that the scale has good reliability, convergent validity, and discriminant validity ($\alpha = .85$).

Procedure

The same procedure was followed as in Study 1, this time with participants completing the CMNI-46.

Analytic Strategy

The same analytic strategy was followed as in Study 1.

Results

Data Screening

In terms of missing data, 8 participants did not verbally indicate their pain tolerance (3 in masculine condition, 3 in effective condition, 2 in control condition). These values were not imputed given pain threshold was not a primary outcome. Five univariate outliers were detected by identifying Z-scores greater than ± 3.29; four were pain threshold scores and one was a pain intensity score. Again these outliers were adjusted to be one unit larger or smaller than the next extreme score. No multivariate outliers were detected.

Following outlier adjustment, the distributions of the variables were checked, revealing that the distributions for pain threshold, pain tolerance, pain intensity, intention to take painkiller, and intention to consult a healthcare professional were non-normally distributed. Transformations were conducted but did not improve the distribution of pain tolerance, intention to take painkiller, and intention to consult healthcare professional, so untransformed data are used for these variables in the subsequent analyses. A log transformation improved the distribution of pain threshold scores, and a reflected square-root transformation (re-reflected following transformation) improved the distribution of pain intensity scores, so the transformed variables are used in subsequent analyses.

Manipulation Check

Seven participants guessed the true aim of the study. As in Study 1, *t*-tests were conducted to ensure participants who had guessed the aim did not score differently on the outcome variables to those who did not. All $p > 0.05$, so the seven participants were included in the subsequent analyses.

One-way ANOVAs were again conducted to test for group differences in believability and relevance of the research summaries. There was a significant group difference in believability $F(2,135) = 4.50$, $p = .013$. As Levene's test of homogeneity of variance was non-significant ($p = .140$), a Tukey post-hoc test was conducted. This revealed that participants in the effective condition ($M = 6.85$, $SD = 2.32$) found their research summary significantly less believable than those in the control ($M = 8.04$, $SD = 1.61$), $p = .010$, but participant ratings of believability were not significantly different across the masculine ($M = 7.62$, $SD = 1.79$) and effective conditions ($p = .173$). Believability of the masculine summary and control summary did not significantly differ ($p = .539$).

Relevance of the research summary to the self was also tested using a one-way ANOVA, and again revealed a significant difference across groups, $F(2,135) = 3.24$, $p = .042$. As Levene's test of homogeneity of variance was non-significant ($p = .899$), a Tukey post-hoc test was conducted. Participants in the masculine condition ($M = 6.15$, $SD = 2.26$) rated their research summary as significantly more relevant than those in the control condition ($M = 5.02$, $SD = 2.20$; $p = .044$), but the difference in relevance between the masculine and effective ($M = 5.91$, $SD = 2.23$) conditions was not significant ($p = .866$). Participants in the effective and control conditions were not significantly different in their reports of relevance ($p = .141$).

As in Study 1, we expect that the manipulation will only be effective if the research summary is believable, and to a lesser extent, relevant to the participant's life. These findings suggest that participants in the effective condition found the 'effective pain response' summary less believable than the control summary, and as (ir)relevant to their lives as the control summary. We will discuss this further in the discussion, but for now we might expect to only see significant differences between the masculine and control conditions.

Preliminary ANOVAs Testing Between Group Differences

Preliminary one-way ANOVAs were conducted to initially test for any group differences in the outcomes of interest, again divided into primary and secondary outcomes. Means and standard deviations are in Table 6.4. No group differences were found in conformity to masculine norms ($F(2, 135) = 0.31$, $p = .738$).

Primary outcomes. One-way ANOVAs revealed that there were no significant group differences in pain tolerance ($F(2,135) = .199$, $p = .820$), intention to take a painkiller

(F(2,135) = 2.25, p = .110), or intention to consult a healthcare professional (F(2,135) = .421, p = .657).

Secondary outcomes. Additional one-way ANOVAs also revealed no significant group differences in pain threshold (F(2,127) = .039, p = .961), pain intensity (F(2,135) = 1.57, p = .211), or pain anxiety (F(2,135) = 1.21, p = .301).

As in Study 1, we had predicted that any effects might depend on general conformity to masculine norms, therefore formal moderation tests were conducted using PROCESS for SPSS to test for group differences including conformity to masculine norms as a moderator. First, I examined the correlations between conformity to masculine norms and the predictor and outcome variables. As in study 1, the Holm-Bonferroni correction was applied (Gaetano, 2013), as shown in Table 6.5. When cautiously applying the correction, the following correlations become non-significant: the relationship between pain intensity and pain tolerance (unadjusted p = .046, adjusted p = 1.00), pain intensity and pain threshold (unadjusted p = .02, adjusted p = .53), pain anxiety and pain threshold (unadjusted p = .02, adjusted p = .55), pain anxiety and pain tolerance (unadjusted p = .02, adjusted p = .55), being in the masculine condition and intention to take a painkiller (unadjusted p = .04, adjusted p = .83), intention to consult a healthcare professional and pain anxiety (unadjusted p = .004, adjusted p = .11), and the relationship between intention to consult a healthcare professional and conformity to masculine norms (unadjusted p = .003, adjusted p = .08). It is likely that at least some of these represent Type II errors, but to be cautious, the adjusted correlations shall be presented and discussed.

Moderation Analyses

Moderation analyses were conducted to test the conditional effects of X (condition) on the primary and secondary outcomes through M (conformity to masculine norms) with a linear regression framework using PROCESS for SPSS Version 2.10 (Hayes, 2013). Once again six tests were conducted; one for each of the outcomes, with dummy coding procedures followed as before. Interaction effects (b^3) are reported below. Uncentered b^1 and b^2 coefficients are reported in Table 6.6. The criterion for statistical significance was again set at p <0.05 throughout.

Table 6.4.
Untransformed Descriptive Statistics for Key Variables in Study 2

		Threshold	Tolerance	Pain intensity	Pain anxiety	Intention to take painkiller	Intention to consult healthcare professional	Conformity to masculine norms
Masculine condition	Mean	18.28	68.07	6.47	3.23	5.83	6.04	1.22
	SD	12.18	39.82	1.54	2.09	1.81	1.40	0.30
Effective condition	Mean	19.89	63.07	5.96	3.00	5.17	5.76	1.17
	SD	18.70	41.38	1.84	2.20	1.77	1.88	0.22
Control condition	Mean	18.19	63.92	5.98	2.53	5.09	5.80	1.20
	SD	12.17	41.67	1.42	2.29	1.95	1.50	0.26
	Mean	18.78	65.05	6.17	2.93	5.37	5.87	1.20
	SD	14.56	40.71	1.58	2.20	1.86	1.60	0.26

Table 6.5.

Holm-Bonferroni Adjusted Correlations for Key Variables in Study 2

		Masculine condition	Effective condition	Threshold	Tolerance	Pain intensity	Pain anxiety	Intention to take painkiller	Intention to consult healthcare professional	Conformity to masculine norms
Masculine condition	*R*	1	-.508**	.004	.053	.150	.101	.178	.078	.055
Effective condition	*R*	-.508**	1	-.023	-.035	-.062	.023	-.075	-.048	-.061
Threshold	*R*	.004	-.023	1	.514**	-.202	-.272	-.165	-.071	.102
Tolerance	*R*	.053	-.035	.514**	1	-.171	-.193	-.091	-.086	-.020
Pain intensity	*R*	.150	-.062	-.202*	-.171	1	.484**	.397**	.362**	-.156
Pain anxiety	*R*	.101	.023	-.244**	-.193*	.484**	1	.292*	.245	-.042
Intention to take painkiller	*R*	.178*	-.075	-.165	-.091	.397**	.292**	1	.662**	-.299**
Intention to consult healthcare professional	*R*	.078	-.048	-.071	-.086	.362**	.245**	.662**	1	-.249
Conformity to masculine norms	*R*	.055	-.061	.102	-.020	-.156	-.042	-.299	-.249**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

‘Masculine condition’ and ‘effective condition’ refer to the dummy coded variables

Table 6.6.
Study 2 Regression Coefficients (b^1, b^2, and b^3) from PROCESS Moderation Analyses

Predictors	Effect on **Pain tolerance**			Effect on **Intention to take painkiller**			Effect on **Intention to consult healthcare professional**			Effect on **Pain threshold**			Effect on **Pain intensity**			Effect on **Pain anxiety**		
	Coeff.	SE	*p*	Coeff.	SE	*p*	Coeff.	SE	*p*	Coeff.	SE	*p*	Coeff.	SE	*p*	Coeff.	SE	*p*
b^1 (focal *X* = masculine condition)	36.85	34.07	0.28	-1.00	1.45	0.49	-0.41	1.29	0.75	-0.03	0.24	0.91	0.72	0.33	0.03*	1.77	1.83	0.33
b^2	8.42	18.23	0.64	-2.88	0.78	0.0003**	-1.82	0.69	0.01**	0.10	0.13	0.43	-0.05	0.18	0.79	0.01	0.98	0.99
b^3	-27.02	27.30	0.32	1.47	1.16	0.21	0.56	1.04	0.59	0.02	0.20	0.94	-0.48	0.27	0.07	-0.88	1.46	0.55
b^1 (focal *X* = effective condition)	-31.19	38.74	0.42	-2.57	1.64	0.12	-2.49	1.46	0.09	-0.16	0.28	0.57	-0.62	0.38	0.10	-1.94	2.07	0.35
b^2	-9.67	15.54	0.53	-2.74	0.66	0.0001**	-2.05	0.58	0.001**	0.08	0.11	0.46	-0.39	0.15	0.01**	-0.86	0.83	0.30
b^3	25.65	32.01	0.42	2.20	1.36	0.11	2.04	1.20	0.09	0.12	0.23	0.60	0.54	0.31	0.09	2.04	1.71	0.24

b^1 refers to the conditional effect of focal *X* (condition) on *Y* when *M* (conformity to masculine norms) equals zero

b^2 refers to the conditional effect of *M* (conformity to masculine norms) on *Y* (outcome) when *X* equals 0

b^3 represents the interaction effect; whether the effect of *X* (focal condition) on *Y* (outcome) depends on *M* (conformity to masculine norms)

Primary outcomes: predicting pain relief outcomes

Predicting pain tolerance. PROCESS analyses found that the overall regression model with the masculine condition as the focal *X* (comparing the masculine condition to the control condition whilst controlling for the effective condition) was not significant in predicting pain tolerance ($R^2 = 0.01$, $F(4, 133) = 0.36$, $p = 0.84$), and the interaction between condition and conformity to masculine norms (b^3) was non-significant (see Table 6.6) and did not significantly improve the model (R^2 change due to interaction = 0.007 $F(1, 133) = 0.98$, $p = 0.32$). The regression model with the effective condition as the focal *X* (comparing the effective condition to the control condition) was also non-significant ($R^2 = 0.008$, $F(4, 133) = 0.28$, $p = 0.89$), and once again the interaction between condition and conformity to masculine norms (b^3) was non-significant and did not significantly improve the model (R^2 change = 0.005, $F(1, 133) = 0.64$, $p = 0.42$). Taken together, these tests suggest that in men, experimental group and conformity to masculine norms were unrelated to pain tolerance.

Predicting intention to take painkillers. PROCESS moderation testing found that the overall regression model comparing the masculine condition to the control condition was indeed significant in predicting intention to take painkillers, ($R^2 = 0.14$, $F(4, 133) = 5.32$, $p = 0.0005$). However, the interaction between masculine condition and conformity to masculine norms was non-significant (see Table 6.6) and did not significantly improve the model (R^2 change due to interaction = 0.01 $F(1, 133) = 1.59$, $p = 0.21$). A similar pattern was found for the model comparing the effective condition to the control condition, which was also significant ($R^2 = 0.14$, $F(4, 133) = 5.62$, $p = 0.0003$), but once again the interaction between condition and conformity to masculine norms was non-significant and did not significantly improve the model (R^2 change = 0.02, $F(1, 133) = 2.64$, $p = 0.11$).

Both regression models suggest that the significant predictive ability is attributed to b^2 (the conditional effect of conformity to masculine norms on intention to take a painkiller when $X = 0$; $p < 0.01$). As mentioned, there are issues with interpreting these statistics in their current form, however it is clear that the significance relates to conformity to masculine norms. Taken together, these results suggest that priming condition was not related to intention to take a painkiller, but that conformity to masculine norms is negatively related to this intention, even when subject to conservative Holm-Bonferroni correction (see Table 6.5).

Predicting intention to consult a healthcare professional. For intention to consult a healthcare professional, PROCESS moderation analyses suggest that although the regression model comparing the masculine prime condition to the control condition is significant in predicting intention to consult a healthcare professional (R^2 = 0.07, F(4, 133) = 2.62, p = 0.04), this is not due to an interaction between condition and conformity to masculine norms (see Table 6.6), which did not significantly improve the model (R^2 change due to interaction = 0.002 F(1, 133) = 0.30, p = 0.59). This is also the case for the model comparing the effective condition to the control condition, which is again significant in predicting intention to consult a healthcare professional (R^2 = 0.09, F(4, 133) = 3.31, p = 0.01), but not due to the non-significant interaction effect (R^2 change due to interaction = 0.02 F(1, 133) = 2.88, p = 0.09).

As with intention to take a painkiller, both regression models suggest that the significant predictive ability is attributed to b^2 (the conditional effect of conformity to masculine norms on intention to consult a healthcare professional when X = 0; $p < 0.01$). As mentioned, there are issues with interpreting these statistics in their current form, however it is again clear that the significance relates to conformity to masculine norms. Therefore, as with intention to take a painkiller, these results suggest that condition was not related to intention to consult a healthcare professional, but that conformity to masculine norms is negatively related to this intention. It seems likely that the non-significance of the Holm-Bonferroni corrected correlation between conformity to masculine norms and intention to take a painkiller (see Table 6.5) may represent a Type II error, particularly as the unadjusted correlation was significant (unadjusted p = .003, adjusted p = .08).

Secondary outcomes: predicting other pain-related outcomes

Predicting pain threshold. PROCESS analyses comparing the masculine condition to the control condition did not significantly predict pain threshold (R^2 = 0.01, F(4, 125) = 0.34, p = 0.85), and the model was not improved by the non-significant interaction (see Table 6.6) between condition and conformity to masculine norms (R^2 change due to interaction = 0.0001 F(1, 125) = 0.006, p = 0.94). The same can be said for the model comparing the effective condition to the control condition (R^2 = 0.01, F(4, 125) = 0.41, p = 0.80) with an R^2 change due to interaction of 0.002 (F(1, 125) = 0.27, p = 0.60). Taken together, these tests suggest that in men, experimental group and conformity to masculine norms were unrelated to pain threshold.

Predicting pain intensity. The regression model with the masculine condition as the focal *X* (comparing the masculine condition to the control condition whilst controlling for the effective condition) was significant in predicting pain intensity ($R^2 = 0.07$, $F(4, 133) = 2.59$, $p = 0.04$), but the interaction between condition and conformity to masculine norms was non-significant (see Table 6.6) and did not significantly improve the model (R^2 change due to interaction = 0.02, $F(1, 133) = 3.23$, $p = 0.07$). The model comparing the effective condition to the control condition was also significant ($R^2 = 0.07$, $F(4, 133) = 2.52$, $p = 0.04$) but once again the interaction between condition and conformity to masculine norms was non-significant and did not significantly improve the model (R^2 change = 0.02, $F(1, 133) = 2.96$, $p = 0.09$).

Table 6.6 suggests that the significant predictive ability is attributed to b^1 (the conditional effect of focal X [condition] on Y when conformity to masculine norms equals zero) or b^2 (the conditional effect of conformity to masculine norms on pain intensity when $X = 0$). As in Study 1, there are issues with interpreting these statistics in their current form. As the aforementioned ANOVA and correlation testing suggest no such relationships exist, it is possible these moderation results are reflecting a Type 1 error, as both model *p* values are approaching non-significance ($p = 0.04$).

Predicting pain anxiety. Finally, the PROCESS regression models for pain anxiety found that the model comparing the masculine condition to the control condition did not significantly predict pain anxiety ($R^2 = 0.02$, $F(4, 133) = 0.76$, $p = 0.55$), and the model was not improved by the b^3 interaction (R^2 change due to interaction = 0.003, $F(1, 133) = 0.36$, $p = 0.55$). The same can be said for the model comparing the effective condition to the control condition ($R^2 = 0.03$, $F(4, 133) = 1.03$, $p = 0.40$), R^2 change due to interaction = 0.01, $F(1, 133) = 1.42$, $p = 0.24$. Taken together, these tests suggest that in men, experimental group and conformity to masculine norms were unrelated to pain anxiety.

To summarise, it seems that although pain tolerance was not predicted by conformity to masculine norms in men, intention to take a painkiller was negatively related to conformity to masculine norms, and there was some evidence of a similar relationship between conformity to masculine norms and intention to consult a healthcare professional. Experimental priming condition appeared to have no significant effect on these primary outcomes, and no moderation effects occurred. In terms of secondary outcomes, there was no

clear evidence that pain threshold, pain intensity, and pain anxiety were predicted by the priming condition, conformity to masculine norms, or an interaction between the two.

Discussion

The aim of the two studies reported here was to investigate whether manipulating gender norms would affect pain responses, and whether gender norm conformity moderated this effect. Generally, it seems that the gender norm manipulations were unrelated to pain responses in both men and women. The one instance in which the gender norm manipulation was effective was in Study 1, which found that women with low scores on the CFNI-45 reported higher pain thresholds in the effective condition compared to the low-conforming women in the control condition. This may be because the 'effective pain response' research summary can generally be said to encourage pain expression and responding to pain promptly and as effectively as possible to remove it. Therefore, an increased pain threshold in the 'effective' condition may represent a rebellion amongst those low in feminine norm conformity to distance themselves from 'normal' female behaviours, although it is not clear why this is the only outcome for which we see this effect. Of course, the interaction effect described here is small and one of few significant effects yielded so it should not be given too much weighting, but this is an interesting interpretation nonetheless.

That no other significant effects of gender norm manipulation on pain responses emerged is surprising given that subtler priming techniques have yielded significant effects. For example, there is evidence that simply priming men with 'masculine' energy drinks compared to neutral water increases pain tolerance through conformity to masculine norms (Abetkoff et al., 2015). It is therefore surprising that the 'masculine pain response' research summary did not increase pain threshold and tolerance. This may be the result of publication bias and the 'replication crisis' (Maxwell, Lau, & Howard, 2015); it is possible that other attempts to alter pain threshold and tolerance through gender priming have also been non-significant and have therefore been harder to get published.

There are a number of potential explanations for why we did not find more significant effects. For example, it may be that the manipulations were not direct enough. Compared to Robinson, Gagnon, Riley, et al. (2003), who were able to alter men and women's pain tolerance by providing them with specific expectations of how long someone of their sex

tends to tolerate cold pressor pain, our manipulations were less direct. We provided participants with a research summary approximately 300 words long reporting how someone of their sex generally responds to pain and uses pain relief, and so did not directly instruct participations in terms of expected cold pressor pain threshold or tolerance. The most direct 'instructions' related to use of painkillers and consulting a healthcare professional, but these were embedded within the summary. It may be that to alter responses to laboratory-induced pain by altering perceptions of gender norms for such behaviours, such alterations need to be much more clear and direct.

Another explanation could be that the experimental manipulations would have had more of an effect had the identity of the participant been socially evaluated (Christensen et al., 2004). In these studies this was not possible due to the nature of the priming task, but it may be that conforming to gender-related pain relief norms in real life is dependent on the risk of social evaluation. It is hard to generate and manipulate dynamics of gender and the pressure to conform to gender norms in a laboratory setting, which may explain why the experimental manipulation was not as effective as we had predicted.

Additionally, it is possible that the manipulations were not as effective as expected given that the believability and relevance to one's own life were not uniform across conditions. Our findings show that the 'feminine pain response' research summary in Study 1 and the 'effective pain response' summary in Study 2 were not as believable as the other summaries. If some participants did not believe the information they read to be true, it is unsurprising that consistent effects did not emerge. These patterns are interesting given that they reinforce the original results of the paper on which the research summaries were based (Wratten et al., 2019), suggesting that 'conformity to masculine norms' and 'normative and effective pain relief for women' really are the predominant expectations for men and women's pain relief, respectively. Moreover, it seems highly plausible that the beliefs and expectations which an individual holds in relation to gender and pain relief are deep-rooted and difficult to change through experimental manipulation.

Although the experimental manipulations were not as effective as had been anticipated, it is worth noting that some interesting correlations emerged across the two studies, the most notable being the negative correlation between conformity to masculine norms and intention to take a painkiller in men. Theoretically, this relationship is unsurprising given that taking a painkiller signals that one is in pain and unable to tolerate it, which can be seen as a direct

violation of masculine norms and stereotypes of stoicism and strength (Addis & Mahalik, 2003). Additionally, there was also evidence of a negative relationship between conformity to masculine norms and intention to consult a healthcare professional in men, and a positive relationship between conformity to feminine norms and intention to take a painkiller in women. Although initially significant, these relationships became non-significant when Holm-Bonferroni corrected. However, even after the correction these were close to significance and may therefore represent a Type II error (Curtin & Schulz, 1998).

It is, however, surprising that conformity to feminine norms was not positively related to pain threshold and tolerance, and that conformity to masculine norms was not negatively related to pain threshold and tolerance. Pain threshold and tolerance have been studied in relation to femininity, with a meta-analysis finding that the more feminine traits one has, the lower their pain threshold and tolerance (Alabas, Tashani, Tabasam, et al., 2012). The same meta-analysis found that the more masculine traits one has, and the more masculine one perceives themselves to be, the higher their pain threshold and tolerance they tend to report (Alabas, Tashani, Tabasam, et al., 2012). Whilst our non-significant correlations between these variables seemingly contradict these findings, it is possible that conformity to masculine norms generally (e.g. prioritising work, taking risks, being self-reliant) may be less directly related to pain threshold and tolerance than masculine traits such as being competitive and ambitious. Similarly, feminine traits such as being expressive and nurturing may be more directly related to pain threshold and tolerance, whereas conformity to feminine norms such as investing in one's appearance, being domestic, modest, and relational are less directly related.

Strengths and Limitations

Despite the generally non-significant findings, these studies are strengthened by the fact that they were well-powered, and that careful attention was paid to designing the gender primes to try to maximise any effects. Although many of the results were non-significant, some of these may be explained by taking a particularly cautious approach due to the number of variables involved. It is important to try to strike a balance between Type I and Type II errors, and it is possible that we have simply been too cautious when interpreting some of the correlational data.

Despite our cautious approach, we have found evidence suggesting that the more a man conforms to masculine norms in other areas of his life, the less likely he is to intend to take a

painkiller. Had we been less cautious, we might also have evidence of a similar relationship between conformity to masculine norms and intention to consult a healthcare professional, and a positive relationship between conformity to feminine norms and intention to take a painkiller in women. This pattern supports and extends our existing understanding of gender and pain. If masculinity is defined in terms of showing strength, stoicism, and self-reliance (Addis & Mahalik, 2003; Samulowitz et al., 2018), it is unsurprising that taking a painkiller would be negatively related to generally behaving in a masculine way. It is also logical that intention to consult a healthcare professional could be negatively related to conformity to masculine norms for this reason, as some of the evidence here suggests. Similarly, if femininity is characterised by being expressive and emotional (Bem, 1974; Samulowitz et al., 2018), but also being relational and managing many social roles (Côté & Coutu, 2010), it is unsurprising that generally behaving in a feminine way might be positively related to taking a painkiller, as a quick fix may be necessary to continue functioning across these many life domains.

Implications and Future Directions

Much of the evidence presented across these two studies suggests that the gender norm manipulations were generally unable to alter pain responses in men and women. We have presented several explanations for why this may be, and future research should strive to delineate which factors contribute to successful gender-based manipulations in experimental laboratory settings. Moreover, the key findings from these studies are correlational, so naturally causation cannot be inferred from our design. Future research ought to investigate the causality of these relationships, if possible. Moreover, the data here pertain to self-reported *intention* to do these things, and therefore additional research is required to understand which factors actually cause an individual to do these things when they experience organic pain in their everyday lives.

These findings may have implications for how men and women use painkillers and consult healthcare professionals when they experience pain. A man who generally behaves in a typically masculine way might be reluctant to do these things, which may prevent him from relieving his pain. We know that pain can disrupt functioning in terms of daily life, work life, and social life (Crombie et al., 1999), and therefore not taking a painkiller or consulting a healthcare professional could potentially prolong such disruptions and even lead to further health problems (Addis & Mahalik, 2003). Small scale changes encouraging men to

overcome these barriers by highlighting how masculinity is best maintained by a healthy and functioning body as a result of taking care of one's health could potentially lead to large-scale change in gender norms and stereotypes.

In conclusion, these studies suggest that it is difficult to experimentally manipulate pain relief norms in a way which influences subsequent pain relief behaviours, even when moderating for gender norm conformity. However, the results advance our understanding of the relationships between gender and pain by providing evidence that conformity to masculine norms may be negatively related to intentions to take a painkiller and consult a healthcare professional, whilst conformity to feminine norms may be positively related to intention to take a painkiller. These results have implications for men who highly conform to masculine norms, as they may be less likely to utilise these generally effective forms of pain relief, further contributing to the negative mental and physical health outcomes which are increasingly associated with men and masculinity (Courtenay, 2003).

Chapter Seven: Discussion

In this thesis, my primary aim was to develop a better understanding of the roles of sex and gender in relation to pain relief, particularly the challenges that gender roles, norms, and stereotypes might pose to men and women seeking effective pain relief. I wanted to consider these challenges in relation to categorical sex, and to explore the different ways in which gender might manifest itself in a person and influence their use of pain relief. I also wanted to better understand the role of motivation in the relationships between sex, gender, and pain relief. I sought to do this by answering three core research questions across six empirical studies (see Figure 7.1). Whilst research is beginning to explore psychosocial factors such as gender in relation to pain expression, little attention has been paid to other pain responses. I chose to focus on pain relief, as the way in which an individual seeks to reduce or remove their pain has important implications for the pain outcomes they will experience. In this chapter I shall first summarise my findings in relation to these themes, then provide answers to my research questions based on the research presented throughout this thesis. I shall then consider the strengths, limitations, and implications of this work, before presenting my final conclusions.

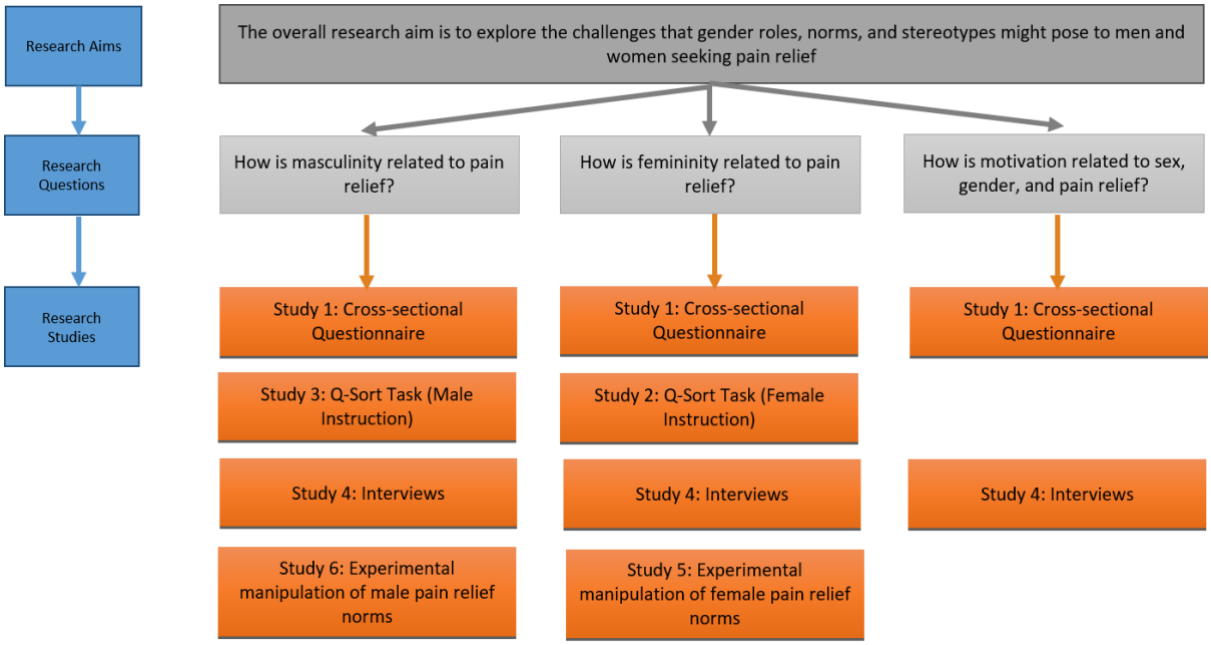

Figure 7.1. An outline of how each research study addressed each research question.

Summary of Findings

The roles of sex and gender in relation to use of pain relief. As mentioned above, a core aim of this thesis was to explore how sex and gender are related to use of pain relief, which I did across all six studies. Focusing on gender as well as sex allowed me to capture the rich variation within the sexes. Although I did not intend to focus specifically on taking painkillers and utilising healthcare services from the outset, these are the forms of pain relief from which the most clear and consistent gendered patterns emerged.

In my first empirical study (Chapter 3), I found that when considered together, gender-related factors significantly predicted use of pain relief whereas categorical sex did not. This highlights just how important it is to consider gender when studying pain, and supports the idea that only studying differences between men and women risks overlooking important within-sex variability (Zell, Krizan, & Teeter, 2015). Moreover, this finding provides further support for the idea that pain studies yielding non-significant results may be the result of gender-homogenous samples (Feijó et al., 2017), i.e. men and women similar in terms of masculinity and femininity. This finding also supports Renk and Creasey (2003)'s suggestion that gender is a better predictor of coping than sex, and the broader literature suggesting that a range of experiences are better predicted by gender than sex category (Hyde et al., 2018).

Specifically, Chapter 3 highlighted how masculinity and femininity can be differentially related to use of pain relief. I found a positive relationship between masculinity and use of internally-focused pain relief strategies such as ignoring the pain, and between femininity and externally-focused strategies such as taking a painkiller. The fact that these relationships were found in both men and women support previous research which has found relationships between masculinity and coping (Nezu & Nezu, 1987), and femininity and coping (Blanchard-Fields, Sulsky, & Robinson-Whelen, 1991), in both sexes.

The Q-methodological studies in Chapter 4 found additional evidence of the gendered nature of pain relief behaviours, particularly connections between men, masculinity, and ignoring the pain. This chapter also provides further evidence that female pain relief is predominantly expected to be conventional and effective, including taking painkillers and utilising healthcare services. However, other stereotypes also emerged, showing that gendered and ungendered representations of pain relief exist in relation to men and women's use of pain relief. In addition to the aforementioned masculine pain relief stereotype, an

ungendered representation of pain relief emerged in which conventional and effective pain relief was also seen as acceptable for men. A stereotype also emerged which incorporated more traditional feminine norms and stereotypes, as well as making reference to some of the issues faced by women in pain, particularly chronic pain. Both men and women held these viewpoints, suggesting that such stereotypes are pervasive across both sexes.

In Chapter 5 I explored these pain relief stereotypes further by thematically analysing semi-structured interview data for factors which influenced perceptions of the social acceptability of different ways of relieving pain. This chapter provided a deeper understanding and more thorough explanations for how gender norms and stereotypes influence expectations for men and women's pain relief, but also perceptions of the effectiveness of the strategy itself. This chapter also illuminated the importance of the sociocultural context in which pain relief norms exist, and how the norms and the social context perpetuate one another to maintain social order and power dynamics. Chiefly, the expectation that men should conform to masculine norms in order to avoid negative social consequences and punishments (primarily from other men) for violating masculine norms emerged most tangibly. This supports existing evidence that the social consequences of norm violation are more negative for men than women (Feinman, 1981; Lytton & Romney, 1991) because of patriarchal power dynamics between men and women (Serano, 2007). In other words, men are more likely than women to endorse traditional gender stereotypes, because it is these stereotypes which uphold the gender hierarchies and power structures which benefit men the most (Levant, 1996).

In Chapter 6 I attempted to alter men and women's pain behaviours by manipulating gender norms for each sex. Whilst such attempts were somewhat unsuccessful, this in itself highlights the importance of the social context in determining how gender might influence use of pain relief, as gender dynamics are hard to replicate in controlled laboratory environments. Despite the non-significant effects of the manipulation itself, interesting correlations emerged between gender norm conformity and intentions to take a painkiller and to consult a healthcare professional. In this chapter I found that conformity to masculine norms in men was negatively related to intention to take a painkiller, contrasting with some of the other results I have found, which shall be discussed in more detail later. In Chapter 6 there was also evidence of a negative relationship between conformity to masculine norms and intention to consult a healthcare professional, supporting the evidence accumulated across Chapters 3, 4, and 5 suggesting that masculinity might pose barriers to seeking

professional help for one's pain. There was also some evidence of a positive relationship between conformity to feminine norms and intention to take a painkiller in women. This supports the evidence in Chapter 3 suggesting that conformity to feminine norms is related to use of more externally-focused pain relief strategies such as taking a painkiller.

Although complex, my results generally suggest that gender is indeed relevant to pain relief, possibly more so than sex, and that gender may foster inequality between men and women in pain in different ways. The literature review in Chapter 1 highlighted how types of pain are gendered (Bernardes et al., 2014), pain expression is gendered (Robinson, Gagnon, Dannecker, et al., 2003; Robinson et al., 2001; Wandner et al., 2012), and pain alters gendered perceptions of others (Bernardes & Lima, 2010). My findings suggest that certain ways of relieving pain are also gendered, suggesting that most aspects of the pain experience can be perceived as gendered, despite this often not being recognised or addressed.

My findings also support and further advance our understanding of some of the sex differences in pain coping strategies highlighted in the introduction. Existing research had shown that women use more medical care (Wijnhoven et al., 2007), social support (Rovner et al., 2017; Unruh et al., 1999) and medication (Bassols et al., 1999; Grossi et al., 2000; Isacson & Bingefors, 2002; Vowles et al., 2014; Wijnhoven et al., 2007) to cope with their pain, whilst men were thought to ignore the pain (Keogh & Denford, 2009) and use more avoidance behaviours (Racine et al., 2015; Rovner et al., 2017). By taking a gendered approach, my results provide a more in-depth understanding of how many of these behaviours are related to gender stereotypes and the expectation that men, and women to a lesser extent, should conform to these when seeking to relieve their pain. In turn this provides a more holistic understanding of how men and women use pain relief and the factors which can influence their choices. A particularly important factor was that of motivation.

The role of motivation. For men to behave in stereotypically masculine ways and for women in stereotypically feminine ways, one needs to be motivated to conform to gender norms. Motivation to relieve pain, and specifically pain relief which conforms to or violates gender norms, has been of interest throughout this thesis. Initially, a Self-Determination Theory (Deci & Ryan, 2008a) approach to pain relief motivation was taken, however exploratory factor analyses shifted the focus to Pool and Schwegler's (2007) approach to differing between self- and other-related motives for norm conformity. In other words, this changed the focus slightly to whether pain relief is sought based on one's own beliefs and

values, because of external pressures from others, or both. The concept of other-related motivation has been particularly apparent when considering gender norm conformity in relation to pain relief, as norm conformity is often driven by implicit or explicit threat or punishment from others.

Chapter 3 revealed that both forms of motivation predicted use of both internally and externally focused pain relief strategies. Although the Q-sort studies in Chapter 4 did not directly focus on motivation, the relevance of other-related motivation to conform to pain relief norms was apparent in Chapter 5. In particular, the theme '*the sociocultural context of pain relief*' and its subtheme '*social consequences of norm violation'* highlighted how privacy and visibility influenced the perceived acceptability of norm violation, due to the risk of judgement and other negative social consequences for non-normative behaviours. Comparatively, there was little spontaneous reflection on the importance of one's own beliefs and values as driving choice of pain relief. Although not studied directly, the importance of motivation may have been unintentionally highlighted in Chapter 6 too. Participants in the laboratory study in Chapter 6 may not have been motivated to conform to the norm portrayed in their research summary due to the lack of social context. The two studies reported in Chapter 6 pose important questions about whether the relationships between pain and gender norms can truly be studied in a controlled laboratory setting, which may be too artificial to reflect the complex and fluid dynamics of gender which occur in everyday life.

Answering My Research Questions

My first research question was '*how is masculinity related to pain relief*?'. The empirical chapters reported here suggest that the relationship between masculinity and effective pain relief is generally negative, as masculinity encourages ignoring the pain, and poses barriers to a range of effective pain relief strategies, particularly seeking help from a healthcare professional. There was also evidence to suggest that masculinity is negatively related to taking analgesics, although conflicting evidence emerged in Chapters 4 and 5, suggesting that some people do not perceive this to be the case as taking an analgesic can be a 'quick fix' solution often preferred by men. In Chapter 4 in particular, analgesics were considered an acceptable aspect of a pattern of 'masculine' pain coping strategies. Analgesic consumption could potentially be viewed as 'masculine' in the sense that quickly removing the pain could maintain independence and control, which are key tenets of masculinity (Courtenay, 2000), and supports the notion that although physical disability (such as pain)

can potentially pose a threat to one's masculinity, coping with such disability in 'masculine' ways can mitigate this threat (Connell, 2005).

Generally, my findings extend our understanding of the relationship between pain and masculinity as largely negative, with masculine stereotypes posing challenges to pain behaviours. My findings are therefore supported by the body of literature documenting masculinity as being characterised by strength, emotional and physical control, a denial of any weakness or vulnerability, and avoidance of dependence on others (Courtenay, 2000). Therefore, attempting to relieve pain, particularly by seeking help from others, could be interpreted as a threat to masculinity. However, as mentioned, I also found alternative ways of conceptualising the relationship between masculinity and pain relief in which a quick fix can be considered a positive masculine response.

The next research question was '*how is femininity related to pain relief?'*. Femininity is most often considered in pain research in relation to men and masculinity, as indeed masculinity is defined in part by an avoidance of femininity (Blazina, 1997). Whilst I certainly found evidence of this in Chapters 4 and 5, I also found evidence of how femininity can encourage more effective pain relief. For example, Chapter 3 documents how conformity to feminine norms was positively related to more frequent use of externally-focused strategies in both men and women, which included taking a painkiller and consulting a healthcare professional. Indeed, there is evidence in Chapter 4 that the overarching expectation for women in pain is to seek conventional and effective pain relief such as these. However, a darker side of femininity also emerged in Chapters 4 and 5, with evidence that negative stereotypes about women in pain may pose barriers to women using these effective strategies. This is particularly the case for consulting a healthcare professional, as women may want to avoid being seen as fulfilling the stereotype of a woman in pain who wastes healthcare services' time (Samulowitz et al., 2018).

The perceptions conveyed in the Q-sort and interview studies in Chapters 4 and 5 support the idea that femininity is sometimes conceptualised as the opposite of masculinity (Bem, 1974). However, the questionnaire study in Chapter 3 reminds us that men and women can have both masculine and feminine traits, and behave in both masculine and feminine ways (Stets & Burke, 2000), and indeed this is important in predicting pain relief behaviours. However, gender hierarchies in many cultures dictate that men are the superior sex, and are expected to maintain masculinity to maintain power (Bailey, 2002). As such, behaviours

which violate masculine norms of strength, control, and self-reliance are ascribed connotations of 'femininity', bolstered by statistics that women do enact behaviours such as utilising healthcare more frequently, as they are not bound by masculine norms (Courtenay, 2000). These themes have also emerged throughout this thesis and are crucial in understanding the relationships between gender and pain behaviours. However, this thesis has also highlighted that stereotypically female behaviours are not necessarily the behaviours of all women. Research has also revealed a darker side to pain and femininity in which women with chronic pain struggle for legitimacy, which can impact the way they respond to pain (Samulowitz et al., 2018), and indeed this theme has also emerged in the research presented here. Taken together, my findings suggest that the relationship between femininity and pain relief is not as straightforward as one might initially expect.

The third research question I have addressed in this thesis is '*how is motivation related to sex, gender, and pain relief?'*. In Chapter 3 I found that motives stemming from both the self and others helped to explain how gender factors predicted use of pain relief, but not sex. In Chapter 5, the importance of other-related motivation in particular became even more apparent. Conformity to both gendered and ungendered pain relief norms was thought to be motivated by the desire to avoid the negative judgements of others. This was the case for both men and women, although participants were best able to reflect on motives for men conforming to masculine norms. Finally, although not studied directly in Chapter 6, the failed manipulations could be explained by the lack of motivation to conform to pain relief norms in a laboratory setting. Cumulatively, my results suggest that the motivational context of pain and its relief cannot be taken for granted, particularly when taking a gendered perspective. The beliefs and expectations of others can have far more of an influence in the ways in which men and women choose to relieve their pain than some might expect.

Cumulatively, the findings from this thesis highlight the importance of the social context in which pain occurs, and how biology (sex) and psychology (gendered traits, conformity to gender norms, and motivation) interact with this context to influence one's use of pain relief. Pain contexts can be rich in gendered expectations, but ungendered expectations also exist. Each individual's lived experience and perception of the world around them is different, and most likely differentially impacts the way in which gender motivates their use of pain relief. However, the relationships between gender, analgesic consumption, and healthcare utilisation are certainly apparent, and can differ for men and women.

Limitations

Throughout each of the chapters presented in this thesis I have discussed specific limitations of each of the studies conducted. Here I shall discuss the most important limitations which must be considered in collectively interpreting my results. Firstly, despite efforts to recruit a diverse range of individuals in each study, it must be said that my participants were predominantly from Western, educated, industrialised, rich, and democratic (WEIRD) societies. This is increasingly recognised as a problem in the behavioural sciences, forcing us to question to whom our results are generalizable, given only a small percentage of the world's population share these characteristics (Henrich, Heine, & Norenzayan, 2010). Moreover, there is also a call for diversifying contexts as well as samples to fully understand psychological and behavioural phenomena (Ceci, Kahan, & Braman, 2010). The internet can help to address these issues (Gosling, Sandy, John, & Potter, 2010), and indeed my online questionnaire in Study 1 has the most diverse sample of all six studies, but the reality is that accessing diverse samples and contexts offline is costly- and beyond the scope of this PhD. Nonetheless, the results reported here are important, insightful, and valuable, but must be interpreted in light of the samples and contexts to which they apply.

Another limitation to consider is whether the measures of gender I have used could be considered somewhat outdated. In Chapter 3, I used the Personal Attributes Questionnaire (Spence, Helmreich, & Stapp, 1974) to measure gendered traits. This measure was developed in response to a revolution in our understanding of gender roles, but gender roles have continued to change since the 70s (Feijó et al., 2017). I was also interested in conformity to gender norms, and in Chapters 3 and 6 I used the Conformity to Masculine Norms Inventory-46 (Parent & Moradi, 2011a) and the Conformity to Feminine Norms Inventory-45 (Parent & Moradi, 2011b). However, it is worth noting that anecdotally, many participants in the laboratory studies (reported in Chapter 6) found these measures to be overly traditional and outdated; not necessarily reflecting contemporary conceptions of masculine and feminine norms. The Q-sorts and interviews reported in Chapters 4 and 5 were the only studies to allow participants to reflect on their personal views of gender in relation to pain relief, and indeed it was in these studies I found more liberal and flexible conceptions of gender.

These different measurements of gender may explain my contradictory findings concerning masculinity and analgesic consumption. Study 1 (Chapter 3) and Study 6 (Chapter 6) suggest that the relationship between masculinity and taking a painkiller is either

non-significant or negative. However, both Q-sort stereotypes for men in Chapter 4 suggested it was socially acceptable for a man to take painkillers, and the interviews in Chapter 5 support this. It is possible that the ways in which gender is related to taking painkillers (amongst other pain relief strategies) is changing over time, and by using outdated measures of gender, we as researchers are not fully capturing or understanding this change. Furthermore, it is possible that how gender is related to pain is different across ages due to generation effects (Feijó et al., 2017). As this was not an aim of this thesis, my results are limited in terms of what they can tell us about how age and gender interact in relation to the use of pain relief. However, developing more current and pain-specific measures of gender will improve our understanding of these issues.

Finally, it is important to recognise that many of the findings reported in this thesis do not reflect actual actions, but rather self-reports of intentions and behaviours. At times, measurements of pain relief involved asking participants to reflect on their use of pain relief over the past three months and to report their intentions to consult a healthcare professional and consume analgesics, due to being unable to gain objective measures of these behaviours. Whilst this is not ideal, and additional research is required to understand how exactly gender might influence actual pain relief behaviours, the results reported here are still valuable. They describe the social and motivational context of gendered action in which pain occurs, and which many men and women are expected to conform to and reproduce in their search for pain relief. As such, they have important implications for pain management practice and theories of pain and gender, and they lay the groundwork for important areas for future research which I shall discuss next.

General Implications

The key findings from this thesis are that masculinity, and to a lesser extent femininity, can pose barriers to utilising healthcare when experiencing pain. In some instances, masculinity may also cause one to ignore the pain and discourage analgesic consumption. As masculinity is commonly associated with men, statistics may underestimate male pain, as masculinity poses numerous barriers which may discourage men from expressing, reporting, and seeking help for their pain. In turn, this may perpetuate suffering and disproportionately disadvantage men from achieving optimal pain relief. However, there

is also evidence that some women may feel limited in their choice of pain management options based on negative stereotypes of women in pain (Samulowitz et al., 2018).

Conforming to the pain relief gender norms highlighted throughout this thesis can have consequences at the intra-personal, situational, positional, and ideological levels (Bernardes et al., 2008). At an intra-personal level, conforming to these norms will likely prevent optimal functioning and may adversely affect one's well-being. For example, the flexibility, willingness to change, and adjustment required to adhere to pain treatment and rehabilitation may be thwarted by strong gender identification. Strong gender identification is also relevant to situational and positional levels of gender, including being a good mother and spouse for women, and being strong, successful, and high performing for men (Côté & Coutu, 2010), all of which could potentially interfere with seeking effective pain relief. Conforming to gender norms such as these also means that there are few astereotypical role models in society, thus perpetuating gender stereotypes at a broader, ideological level (Bernardes et al., 2008), which can be harmful for both men and women (Addis, Mansfield, & Syzdek, 2010).

Implications for pain management practices. If these findings are replicated, there are many ways in which these results could potentially have implications for practice. As mentioned, gender may influence pain management at an individual level, for example by influencing whether one seeks advice and consumes analgesics, and such gendered viewpoints are likely to be resistant to change. Stereotypes are pervasive and most likely influence the way individuals express, communicate, and seek help for pain, more than researchers and practitioners realise. Healthcare practitioners should be aware of this in supporting individual self-management, but should also be cognizant of their own biases.

A range of stereotypes can influence the actions and reactions of healthcare professionals as well as the individual in pain, as stereotypes can unknowingly cause biased decision making which can further contribute to healthcare disparities (Bonham, 2001; Burgess, Van Ryn, Crowley-Matoka, & Malat, 2006). Gender biases in healthcare contexts are already well-documented (Bernardes, Costa, & Carvalho, 2013; Hoffmann & Tarzian, 2001; Schäfer, Prkachin, Kaseweter, & Williams, 2016), suggesting that gender also influences practitioner-delivered pain management in emergency, medical, and surgical

environments. My findings extend our understanding of how these biases might extend to pain relief.

Pain inequalities based on gender are important for a number of reasons. Inappropriate diagnosis and/or treatment can negatively impact quality of life (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006). Moreover, poor pain management has been linked to suicidal ideation and suicide attempts (Ratcliffe, Enns, Belik, & Sareen, 2008). In particular, the ways in which masculinity can disadvantage men in pain are clearly linked to the broader male reluctance to seek help for mental or physical issues (Addis & Mahalik, 2003; Galdas et al., 2007; Mansfield, Addis, & Mahalik, 2003; O'brien et al., 2005). This reluctance may help to explain the paradox in which women live longer than men despite higher female morbidity rates (Austad, 2006), particularly given the links to male suicide (Möller-Leimkühler, 2003).

My findings complement a growing body of research which suggests that gender is implicated in pain inequalities, and therefore it is vital that we surpass gendered expectations which result in individual needs being overlooked in order to provide both men and women with more equitable care (Samulowitz et al., 2018). One way of doing this may be through unconscious bias training to remove the automatic assumptions made about individuals, which in a healthcare setting can also help to facilitate a deliberate, individualised approach to patient care (Chapman, Kaatz, & Carnes, 2013).

Implications for theories of pain and gender. My findings also have implications for existing theories of pain and gender. First and foremost, the results support taking a biopsychosocial approach to pain and pain management. From my results it is clear that there are different gendered social expectations for pain relief prescribed to individuals based on their categorical sex (male/female based on biological markers). Moreover, perceived social punishments were clear motivators for conforming to these expectations, and personal gendered traits and behaviours were also related to use of pain relief. It is promising to see that psychological and social factors are increasingly recognised alongside biology in the pain literature, and it is my hope that such recognition will one day include worthy consideration of gender.

My results show that not only can gender predict use of pain relief better than sex, but that there are different manifestations of gender which need to be considered in relation to pain. Gender is multifaceted, and therefore can influence experiences of pain and attempts at

its relief in many different ways. The results of this thesis demonstrate how gendered traits, conformity to gender norms, and gender stereotypes are differentially related to pain outcomes. These are just a few examples of the ways in which different aspects of gender can be related to pain and its relief, and support the literature urging a shift in focus from male-female binaries to broader, more inclusive models of gender (Hyde et al., 2018). These results ought to be compiled with extant pain and gender research to build a comprehensive and predictive model of gender and pain in order to guide future research. Such a model should also respect the different levels at which gender may influence pain experiences, including the intra-individual, situational, positional, and ideological (Bernardes et al., 2008), all of which have been touched upon throughout this thesis.

My results also have implications for existing models of pain. For example, the Fear Avoidance Model (Vlaeyen & Linton, 2000) recognises the role of psychological factors such as anxiety and depression in the development and maintenance of chronic pain, but does not consider how psychosocial factors related to gender might also influence how an individual responds to pain. The Fear Avoidance Model is based on the premise that when pain is experienced, fear and anxiety can cause avoidance behaviours with the intention of preventing additional pain. The results of this thesis suggest that fear and anxiety may cause other forms of avoidant behaviours, instead with the intention of preventing a threat to one's gender identity. For example, a man may avoid taking painkillers lest he be judged negatively by others, or feel less 'manly' in himself for not being able to endure the pain. A woman may fear consulting a healthcare professional about her pain in case she is judged as wasting their time. Acknowledging pain and seeking to relieve it can have different implications for different individuals; the results of this thesis document some of the ways in which such acts could threaten one's gendered sense of self and the gendered dynamics of their everyday lives. Pain can threaten the gender identities of both men and women, which could in turn make them afraid to confront their pain and therefore delay or prevent their recovery.

Directions for Future Research

As mentioned, future research should strive to explore the relationships between sex, gender, and pain relief in more diverse samples to improve our understanding of to whom these results are generalizable. Future research should also explore the intersectionality of pain experiences. Although the research reported here has focused on gender in pain contexts,

it is worth noting that other demographic characteristics are likely to interact with gender in relation to pain relief. For example, age (Arslanian-Engoren, 2000), race (Hoffman, Trawalter, Axt, & Oliver, 2016), and socio-economic status (Macfarlane, Norrie, Atherton, Power, & Jones, 2008) are also likely to influence use of pain relief. Future research must explore intersectional pain inequality; any gender-based inequality should also be considered in relation to other inequalities and biases the individual may face. This includes transgender and non-binary individuals, as failing to include such individuals renders research, theories, and models of gender and pain incomplete.

Ideally, future research will also take a more uniform and contemporary approach to gender. As mentioned, changing gender roles and the utilisation of outdated measures of gender may further confuse our understanding of how gender is related to pain and its relief. A more contemporary understanding of how gendered expectations and stereotypes can pose barriers to pain relief will also help to inform interventions. A particularly interesting area of enquiry would be whether it is best to carefully challenge strong and pervasive gendered beliefs related to pain and pain management, or whether it is better to offer treatment options which may be more congruent with the individual's beliefs and preferred coping style. Another interesting area for potential intervention would be how we, as a society, can work towards ungendering pain behaviours, which would help to make the most effective pain relief options accessible to all individuals, regardless of their sex.

Conclusions

Pain is an unavoidable part of life, experienced by almost all individuals at one point or another. Pain does not discriminate, and yet the experience of pain varies across individuals, societies, and cultures. Research exploring this variation has advanced our understanding of pain, which is no longer considered a purely physical experience; psychosocial factors are also implicated (Williams & Craig, 2016). I conducted a series of six studies to improve our understanding of these factors, specifically how sex and gender are related to ways of relieving pain. This included studying both masculinity and femininity in relation to pain relief, as well as the motivation to relieve pain and to conform to gender norms in pain contexts. My key findings were that masculinity can foster ignoring the pain and can discourage healthcare utilisation. The relationship between masculinity and analgesic consumption seems to be more contradictory, with some evidence that the relationship is

negative, contrasting with evidence that taking painkillers is in fact acceptable for a man in pain. Conversely, evidence of the positive relationship between femininity and analgesic consumption was more consistent. Generally, it seems as though femininity poses far fewer barriers to pain relief, although there is some evidence suggesting female healthcare utilisation can be perceived as negative. These gendered barriers to pain relief have implications for self- management as well as pain management in healthcare contexts. In particular, these results will allow healthcare practitioners to better understand the patient's gendered perspective, and help to facilitate a collaborative patient-practitioner effort to achieving more optimal pain relief. It is my hope that this work represents an important step towards minimising the suffering and disruption that pain can cause by improving our understanding of gender inequalities in pain relief, which is undoubtedly the first step in overcoming them.

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Appendices

Appendix 1: The Pain Relief Strategies Scale

Please answer the following questions still thinking about the most important pain experience you chose earlier. If you have not experienced pain in the last 3 months, please answer this question thinking about how you generally respond to pain.

We know that people try different things to reduce or remove their pain. Please indicate the extent to which you tried the following things to reduce or remove your pain over the last 3 months, or in general if you have not been in pain in the last 3 months.

1. Relaxation

Never Occasionally Fairly Often Many Times Very Often Always

2. Distract myself from the pain

Never Occasionally Fairly Often Many Times Very Often Always

3. Do something that makes me happy

Never Occasionally Fairly Often Many Times Very Often Always

4. Hot treatments

Never Occasionally Fairly Often Many Times Very Often Always

5. Ask friends for advice

Never Occasionally Fairly Often Many Times Very Often Always

6. Take a painkiller

Never Occasionally Fairly Often Many Times Very Often Always

7. Ignore the pain

Never Occasionally Fairly Often Many Times Very Often Always

8. Meditation

Never Occasionally Fairly Often Many Times Very Often Always

9. Ask family for advice

Never Occasionally Fairly Often Many Times Very Often Always

10. Cold treatments

Never Occasionally Fairly Often Many Times Very Often Always

11. Praying

Never Occasionally Fairly Often Many Times Very Often Always

12. Do something that makes me laugh

Never Occasionally Fairly Often Many Times Very Often Always

13. Massage

Never Occasionally Fairly Often Many Times Very Often Always

14. Do something to vent anger

Never Occasionally Fairly Often Many Times Very Often Always

15. Hope the pain will go away

Never Occasionally Fairly Often Many Times Very Often Always

16. Use medical device e.g. TENS

Never Occasionally Fairly Often Many Times Very Often Always

17. Topical treatments e.g. gel, cream

Never Occasionally Fairly Often Many Times Very Often Always

18. Acupuncture

Never Occasionally Fairly Often Many Times Very Often Always

19. Ask a healthcare professional for advice

Never Occasionally Fairly Often Many Times Very Often Always

20. Go to bed

Never Occasionally Fairly Often Many Times Very Often Always

21. Yoga

Never Occasionally Fairly Often Many Times Very Often Always

22. Drink alcohol

Never Occasionally Fairly Often Many Times Very Often Always

23. Search for information online

Never Occasionally Fairly Often Many Times Very Often Always

24. Exercise

Never Occasionally Fairly Often Many Times Very Often Always

25. Herbal remedies

Never Occasionally Fairly Often Many Times Very Often Always

26. Do something to vent frustration

Never Occasionally Fairly Often Many Times Very Often Always

Scoring

The externally focused strategies subscale can be scored by calculating the mean for the following items: 4, 5, 6, 9, 10, 11, 14, 16, 17, 18, 19, 20, 25

The internally focused strategies subscale can be scored by calculating the mean for the following items: 1, 2, 3, 7, 12

Appendix 2: The Pain Relief Motivation Scale

We are interested in why you do what you do to try to reduce or remove your pain. Please indicate the extent to which the following statements are true of you.

When I am in pain, I do what I do to reduce or remove the pain…

	Not true for me		**Sometimes true for me**		**Very true for me**
1 Because of the pressure I feel from others	0	1	2	3	4
2 Because it's how others expect me to behave	0	1	2	3	4
3 Because of how I was raised	0	1	2	3	4
4 Because of how it impacts my self-esteem	0	1	2	3	4
5 Because it is consistent with what I value	0	1	2	3	4
6 Because it is a part of who I am	0	1	2	3	4
7 Because of how it makes me feel about myself	0	1	2	3	4
8 Because of its impact on my health	0	1	2	3	4
9 Because of what others would think of me	0	1	2	3	4
10 Because of my beliefs	0	1	2	3	4

Scoring

The Self-Related Motivation subscale score is calculated by finding the mean of the scores for the following items: 5, 6, 7, 8, 10

The Other-Related Motivation subscale score is calculated by finding the mean of the scores for the following items: 1, 2, 9

Appendix 3: Alternative Solutions for The Pain Relief Strategies Scale (Chapter 2)

5-Factor Solution

Table A1.

Varimax-Rotated Factor Loadings for the Pain Relief Strategies Scale (5 Factors)

Items	*Component*				
	1	*2*	*3*	*4*	*5*
Ask family for advice	**.741***	.000	.111	.218	.092
Ask friends for advice	**.728***	.157	.148	.113	.085
Do something to vent frustration	**.640***	.432	.196	-.007	-.093
Do something to vent anger	.598*	.496	.172	.011	-.040
Praying	.502*	.326	-.033	.201	-.024
Cold treatments	.489*	.306	.008	.367	-.002
Herbal remedies	.483*	.329	.055	.395	-.044
Search for information online	.447*	.010	.383	.229	.165
Ask a healthcare professional for advice	.440*	.233	.094	.278	.339
Acupuncture	.320	**.677***	-.035	.344	.066
Drink alcohol	.198	**.675***	.127	-.103	.155
Yoga	.105	**.660***	.149	.313	-.031
Meditation	.152	**.633***	.240	.315	-.031
Use medical devices e.g. TENS	.432	.467*	.019	.413	.150
Exercise	.172	.391*	.272	.268	-.285
Do something that makes me happy	.152	.135	**.779***	.005	.081
Distract myself from the pain	.001	.121	**.776***	.091	-.088
Do something that makes me laugh	.384	.274	**.614***	-.039	.052

Relaxation	.047	-.030	.574*	.445	.010
Massage	.099	.191	.175	**.712***	.068
Topical treatments e.g. gel, cream	.374	.094	-.045	**.615***	.044
Hot treatments	.154	.180	.078	**.553***	.190
Take a painkiller	-.001	.208	.059	.084	**.841***
Ignore the pain	-.046	.244	.363*	-.100	-.451
Go to bed	.354	-.124	.305	.250	.433*

Note. Items in bold represent markers that have factor loadings greater than |.30| and are above |.20| across factors. An asterisk indicates the highest loading (above |.30|) for that item.

Table A2.

Item and Component Structure of Pain Relief Strategies Scale (5 Factors)

Component 1	Component 2	Component 3	Component 4	Component 5
Ask family for advice	Acupuncture	Do something that makes me happy	Massage	Take a painkiller
Ask friends for advice	Drink alcohol	Distract myself from the pain	Topical treatments e.g. gel, cream	
Do something to vent frustration	Yoga	Do something that makes me laugh	Hot treatments	
	Meditation			
Cronbach's Alpha: .737	Cronbach's Alpha: .765	Cronbach's Alpha: .752	Cronbach's Alpha: .619	Cronbach's Alpha: N/A

3-Factor Solution

Table A3.

Varimax-Rotated Factor Loadings for the Pain Relief Strategies Scale (3 Components Extracted)

	Component		
Item	*1*	*2*	*3*
Acupuncture	**.763***	.229	-.011
Do something to vent anger	**.698***	.146	.209
Do something to vent frustration	**.674***	.134	.237
Yoga	**.649***	.061	.170
Meditation	**.645***	.093	.263
Use medical devices e.g. TENS	**.641***	.421	.035
Herbal remedies	**.594***	.337	.085
Drink alcohol	**.577***	-.010	.138
Cold treatments	**.566***	.356	.034
Praying	**.561***	.248	-.004
Exercise	.508*	-.037	.310
Ask friends for advice	.481*	.417	.173
Go to bed	.006	**.625***	.280
Take a painkiller	-.018	**.559***	-.004
Ask a healthcare professional for advice	.378	.530*	.089
Ask family for advice	.383	.520*	.132
Topical treatments e.g. gel, cream	.381	.517*	-.031
Hot treatments	.287	.467*	.073
Massage	.326	.451*	.177
Search for information online	.216	.450*	.386
Ignore the pain	.239	-.414	.402*
Distract myself from the pain	.093	-.002	**.783***
Do something that makes me happy	.121	.127	**.778***
Do something that makes me laugh	.355	.150	**.629***
Relaxation	.056	.306	**.572***

Note. Items in bold represent markers that have factor loadings greater than |.30| and are above |.20| across factors. An asterisk indicates the highest loading (above |.30|) for that item.

Table A4.

Item and Component Structure of Pain Relief Strategies Scale (3 Components Extracted)

Component 1	Component 2	Component 3
Acupuncture	Go to bed	Distract myself from the pain
Do something to vent anger	Take a painkiller	Do something that makes me happy
Do something to vent frustration		Do something that makes me laugh
Yoga		Relaxation
Meditation		
Use medical devices		
Herbal remedies		
Drink alcohol		
Cold treatments		
Praying		
Cronbach's Alpha: .873	Cronbach's Alpha: .443	Cronbach's Alpha: .743

Appendix 4: Alternative solutions for the Analgesic Attitudes, Choice, & Use Scale (Chapter 2)

Individual Subscale Solutions: Analgesic Attitudes

I conducted a PCA for each of the subscales using the method outlined in the General Analytic Strategy in Chapter 2. The Analgesic Attitudes subscale initially consisted of 6 items, but 'I believe non-medicinal methods of pain relief are preferable' was removed due to correlation coefficients below .30. The PCA produced two components with eigenvalues greater than 1 (2.16 and 1.00), and the scree also occurred after the second component. Table A5 displays the number of markers for each factor produced by the Varimax rotation, and clearly shows that both factors are required for interpretability.

Identification of the two-factor solution as the best representation of the factor structure of the Analgesic Attitudes subscale then allowed me to inspect the factor markers (see Table A6). Again, this tells us how the factors should be defined by looking at the item loadings on factors, as well as which items are most strongly related to the two components of attitudes towards analgesics. Component 1 appears to reflect positive attitudes towards analgesics, whereas Component 2 reflects negative attitudes towards analgesics. Despite the ease of interpretability of the two-factor structure for the Analgesic Attitudes subscale, Table A7 shows that neither component meets the standard of .70 for Cronbach's Alpha.

Table A5.

Number of Markers per Component for Analgesic Attitudes Subscale

	No. of Markers for Component Number	
No. of Components in Solution	*1*	*2*
1	3(N/A)	
2	3(3)	2(2)

Note. The numbers outside parentheses represent the number of markers using Watson et al.'s (1995) criteria of factor loadings greater than |.30|. The numbers within parentheses represent the number of markers using Bedford's (1997) criteria of factor loading greater than |.30| and where the major loading is |.20| greater than any cross-loading.

Table A6.

Varimax-Rotated Factor Loadings of the Analgesic Attitudes Subscale

Items	*Component*	
	1	*2*
I would rather take a painkiller than suffer with pain	**.812***	-.044
Painkillers are a safe means of relieving general aches and pains	**.778***	-.232
I believe I can take different types of painkiller together	**.692***	-.120
I think most painkillers are too strong to take for everyday aches and pains	-.003	**.869***
I am worried about the negative side effects when I take a painkiller	-.305	**.705***

Note. Items in bold represent markers that have factor loadings greater than |.30| and are above |.20| across factors. An asterisk indicates the highest loading (above |.30|) for that item.

Table A7.

Item and Component Structure of Analgesic Attitudes Subscale

Component 1 (Positive Attitudes)	Component 2 (Negative Attitudes)
I would rather take a painkiller than suffer with pain	I think most painkillers are too strong to take for everyday aches and pains
Painkillers are a safe means of relieving general aches and pains	I am worried about the negative side effects when I take a painkiller
I believe I can take different types of painkiller together	
Cronbach's Alpha = .659	Cronbach's Alpha = .466

Individual Subscale Solutions: Analgesic Use

Initially Vowles et al. (2014) proposed eight items for the Analgesic Use subscale, but one item was excluded as it did not load during their analysis, so only seven items were used in this study. Additionally, 'I only take painkillers for particularly severe pain (when the pain is preventing me from carrying out normal tasks)' was removed due to correlation coefficients below .30. The PCA revealed two components had eigenvalues greater than 1 (2.27 and 1.22), and the scree plot also suggested the scree occurred after the second component. Table A8 displays the number of markers for each factor produced by the Varimax rotation, and again suggests that both factors are required for interpretability. Once again, having identified this two-factor solution as the best representation of the factor structure of the Analgesic Use subscale, I then inspected the factor markers (see Table A9). However, Table A10 shows that much like the Analgesic Attitudes subscale, neither component meets the standard of .70 for Cronbach's Alpha.

Table A8.

Number of Markers per Factor for Analgesic Use Subscale

	No. of Markers for Component Number	
No. of Components in Solution	*1*	*2*
1	3(N/A)	
2	3(3)	3(3)

Note. The numbers outside parentheses represent the number of markers using Watson et al.'s (1995) criteria of factor loadings greater than |.30|. The numbers within parentheses represent the number of markers using Bedford's (1997) criteria of factor loading greater than |.30| and where the major loading is |.20| greater than any cross-loading.

Table A9.

Varimax-Rotated Factor Loadings of the Analgesic Use Sub-Scale

Items	*Component*	
	1	*2*
I take a weaker painkiller to start with and will only 'upgrade' to a stronger painkiller if pain persists	**.837***	.019
I take a small dose initially, then increase this if the pain does not diminish	**.817***	.123
I wait for a short period of time before taking a painkiller and then, if pain persists, will take one	**.558***	.218
I take the painkiller I think will remove my pain as quickly as possible	.177	**.838***
I take a painkiller as soon as pain occurs	-.033	**.766***
I take different painkillers for different types of pain	.276	**.592***

Note. Items in bold represent markers that have factor loadings greater than |.30| and are above |.20| across factors. An asterisk indicates the highest loading (above |.30|) for that item

Table A10.

Item and Component Structure of Analgesic Use Subscale

Component 1	Component 2
I take a weaker painkiller to start with and will only 'upgrade' to a stronger painkiller if pain persists	I take the painkiller I think will remove my pain as quickly as possible
I take a small dose initially, then increase this if the pain does not diminish	I take a painkiller as soon as pain occurs
I wait for a short period of time before taking a painkiller and then, if pain persists, will take one	I take different painkillers for different types of pain
Cronbach's Alpha = .631	Cronbach's Alpha = .615

Individual Subscale Solutions: Analgesic Choice

Vowles et al. (2014) initially proposed 12 items representing factors which could influence choice of analgesics, but one item was excluded as it did not load during their factor analysis. Therefore, 11 items were used in this study, and for our PCA all 11 were included as all had correlation coefficients between .30 and .90. Again, the method outlined in the General Analytic Strategy was followed, producing a solution for which three components had eigenvalues greater than 1 (3.54, 1.14, and 1.11), but the scree plot suggested the scree occurred after the first component. As always, factor markers were highlighted using the criteria outlined in the General Analytic Strategy, with the outcome shown in Table A11. Table A11 shows that in fact all three components may be required for maximum representation and interpretability, so the factor markers in Table A12 were inspected to help decide upon the best solution. The best solution, based on the criteria outlined in the General Analytic Method, is presented in Table A13. Although component 1 exceeds the .70 standard for Cronbach's Alpha, components 2 and 3 do not.

Table A11.

Number of Markers per Component for the Analgesic Choice Subscale

No. of Components in Solution	*No. of Markers for Component Number*		
	1	*2*	*3*
1	4(N/A)		
2	4(3)	4(3)	
3	4(3)	4(3)	3(3)

Note. The numbers outside parentheses represent the number of markers using Watson et al.'s (1995) criteria of factor loadings greater than |.30|. The numbers within parentheses represent the number of markers using Bedford's (1997) criteria of factor loading greater than |.30| and where the major loading is |.20| greater than any cross-loading.

Table A12.

Varimax-Rotated Factor Loadings of the Analgesic Choice Subscale

Items	*Component*		
	1	*2*	*3*
How long pain relief lasts	**.819***	.252	.200
How quickly pain is removed	**.776***	.258	.257
The painkiller is safe to take	**.718***	.001	.096
Recommendation from healthcare professional	.170	**.743***	-.094
The painkiller is a brand I can trust	.002	**.679***	.340
The painkiller is stronger than others	.131	**.629***	.274
The painkiller targets a specific type of pain	.421	.549*	.044
The painkiller is value for money	.174	-.085	**.753***
The painkiller is suitable for all types of pain	.137	.237	**.668***
The painkiller is easy to take (e.g. easy to swallow)	.145	.214	**.652***

Note. Items in bold represent markers that have factor loadings greater than |.30| and are above |.20| across factors. An asterisk indicates the highest loading (above |.30|) for that item.

Table A13.

Item and Component Structure of Analgesic Choice Scale

Component 1	Component 2	Component 3
How long pain relief lasts	Recommendation from healthcare professional	The painkiller is value for money
How quickly pain is removed	The painkiller is a brand I can trust	The painkiller is suitable for all types of pain
The painkiller is safe to take	The painkiller is stronger than others	The painkiller is easy to take (e.g. easy to swallow)
Cronbach's Alpha: .756	Cronbach's Alpha: .586	Cronbach's Alpha: .569

Replicating Vowles et al. (2014) Factor Analyses

I decided to replicate the factor analytic method utilised by Vowles et al. (2014) with their original 28-item scale producing a seven factor solution. Again, 'I believe non-medicinal methods of pain relief are preferable' and 'I only take painkillers for particularly severe pain (when the pain is preventing me from carrying out normal tasks)' were both removed as all correlation coefficients were below 0.3.

In accordance with Vowles et al. (2014), a maximum likelihood method of extraction was selected with a Promax rotation. Vowles et al. (2014) selected their seven factor solution based on eigenvalues above 1, variance estimates, and reviewing factor loadings. Whilst their seven factors explained 48% in variance, only six components of ours had eigenvalues greater than 1 (4.83, 2.56, 1.85, 1.31, 1.27, and 1.06), explaining 58.5% of variance.

Vowles et al. (2014) ensured their factor loadings were parsimonious with no indication of significant cross-loading, but did not specify how, so we once again used the criteria outlined in the General Analytic Strategy of Watson et al. (1995) and Bedford (1997) to select our factor markers. However, this time loadings lower than 0.32 (as opposed to 0.30 used previously) were excluded in accordance with Vowles et al. (2014). The number of markers per factor is shown in Table A14. It was not clear what the most representative factor structure is based on factor markers, so the factor loadings and markers were observed in more detail (see Table A15). As can be seen in Table A16, the resulting components/factors do not align well with that of Vowles et al. (2014), with some brief exceptions in Components 3 and 4. However, the factor structure was not satisfactorily replicated, and Table A16 also demonstrates that only components 3 and 4 meet the .70 standard for Cronbach's Alpha.

Table A14.

Number of Markers per Factor for the Analgesic Attitudes, Use, and Choice (Combined) using the method of Vowles et al. (2014)

No. of Factors in Solution	*No. of Markers for Factor Number*					
	1	*2*	*3*	*4*	*5*	*6*
1	6(N/A)					
2	6(5)	5(5)				
3	6(5)	5(5)	2(2)			
4	6(5)	5(5)	2(2)	3(2)		
5	6(4)	5(4)	2(2)	3(2)	1(1)	
6	6(3)	5(4)	2(2)	3(2)	1(1)	1(1)

Note. The numbers outside parentheses represent the number of markers using Vowles et al.'s (2014) criteria of factor loadings greater than |.32|. The numbers within parentheses represent the number of markers using Bedford's (1997) criteria of factor loading greater than |.32| and where the major loading is |.20| greater than any cross-loading.

Table A15.

Promax-Rotated Factor Loadings for the Analgesic Attitudes, Use, and Choice (Combined) using the method of Vowles et al. (2014)

Items	*Factor*					
	1	*2*	*3*	*4*	*5*	*6*
The painkiller is a brand I can trust	**.797***	-.105	-.133	-.102	-.030	.165
Recommendation from healthcare professional	**.577***	-.207	-.031	-.043	.181	-.068
The painkiller is easy to take (e.g. easy to swallow)	**.417***	.055	.099	-.009	-.095	-.001
The painkiller targets a specific type of pain	.415*	-.176	.197	-.044	.284	-.027
The painkiller is stronger than others	.361*	.007	.146	-.091	.163	.196
The painkiller is suitable for all types of pain	.344*	.196	.124	.144	-.288	.039
The painkiller is value for money	.216	.160	.131	.121	-.188	-.028
Painkillers are a safe means of relieving general aches and pains	.138	**.808***	-.179	.051	.085	-.097
I am worried about the negative side effects when I take a painkiller R	-.193	**.600***	-.091	-.168	.039	-.067
I would rather take a painkiller than suffer with pain	.055	**.496***	.129	.073	.070	.208
I think most painkillers are too strong to take for	-.078	**.429***	-.032	-.400	.005	.047

everyday aches and pains R						
I believe I can take different types of painkiller together	-.338	.343*	.126	.035	.291	.093
I believe non-medicinal methods of pain relief are preferable	.025	-.306	-.021	.155	.095	-.108
I take the painkiller I think will remove my pain as quickly as possible	-.001	.253	.251	.108	.192	.244
How long pain relief lasts	-.002	-.115	**.960***	-.025	-.038	-.105
How quickly pain is removed	.008	-.061	**.959***	-.069	-.072	-.026
I take a weaker painkiller to start with and will only 'upgrade' to a stronger painkiller if pain persists	-.144	-.235	-.025	**.821***	.090	.007
I take a small dose initially, then increase this if the pain does not diminish	-.015	-.139	-.062	**.774***	-.035	.115
I wait for a short period of time before taking a painkiller and then, if pain persists, will take one	.049	.245	-.030	.371*	.043	-.168
I take different painkillers for different types of pain	.037	.093	-.103	.050	**.817***	-.060
I take a painkiller as soon as pain occurs	.247	.141	-.071	.064	-.015	**.660***

The painkiller is safe to take	.217	.171	.288	.059	.104	-.454

Note. Items in bold represent markers that have factor loadings greater than |.30| and are above |.20| across factors. An asterisk indicates the highest loading (above |.30|) for that item.

Table A16.

Item and Component Structure of Analgesic Attitudes, Use, and Choice (Combined) using the method of Vowles et al. (2014)

Component 1	*Component 2*	*Component 3*	*Component 4*	*Component 5*	*Component 6*
The painkiller is a brand I can trust (Belief that analgesics are safe and effective)	Painkillers are a safe means of relieving general aches and pains (Safety advice from health experts)	How long pain relief lasts (Analgesic qualities: onset and duration)	I take a weaker painkiller to start with and will only 'upgrade' to a stronger painkiller if pain persists (Dosing practices: titration)	I take different painkillers for different types of pain (Knowledge about how analgesics work)	I take a painkiller as soon as pain occurs (Take analgesic as soon as pain occurs)
Recommendation from healthcare professional (Safety advice from health experts)	I am worried about the negative side effects when I take a painkiller (Worry about analgesics)	How quickly pain is removed (Analgesic qualities: onset and duration)	I take a small dose initially, then increase this if the pain does not diminish (Dosing practices: titration)		
The painkiller is easy to take (e.g. easy to swallow) (Belief that analgesics are safe and effective)	I would rather take a painkiller than suffer with pain (Analgesic qualities: onset and duration)				
	I think most painkillers are too strong to take for everyday aches and pains (Worry about analgesics)				
Cronbach's Alpha: .528	Cronbach's Alpha: .607	Cronbach's Alpha: .865	Cronbach's Alpha: .707	Cronbach's Alpha: N/A	Cronbach's Alpha: N/A

(Note: in parentheses are the factors onto which the items loaded for Vowles et al., 2014)

Appendix 5: Chapter 3 Additional Analyses

Sex differences in use of individual pain relief strategies

Due to non-normal distribution, sex differences in reported use of each individual pain relief strategy, taken from the Pain Relief Strategies Scale, were tested using Mann-Whitney U tests. Men reported using the following strategies significantly more than women:

- Use of medical devices e.g. TENS (Z = -4.34, p <.01)
- Acupuncture (Z = -2.03, p = .043)
- Cold treatments (Z = -2.48, p = .013)
- Topical treatments (Z = -1.99, p = .046)
- Ask friends for advice (Z = -2.60, p = .009)
- Ask family for advice (Z = -2.82, p = .005)
- Do something to vent anger (Z = -2.51, p = .012)
- Praying (Z = -4.04, p <.01)
- Hot treatments (Z = -2.92, p = .004)
- Take a painkiller (Z = -3.89, p <.01)
- Relaxation (Z = -2.09, p = .037)

No significant sex differences were found for:

- Herbal remedies (Z = -1.54, p = .124)
- Ask a healthcare professional for advice (Z = -2.78, p = .076)
- Go to bed (Z = -0.53, p = .597)
- Distract myself from the pain (Z = -0.77, p = .441)
- Do something that makes me happy (Z = -0.97, p = .331)
- Do something that makes me laugh (Z = -0.23, p = .821)
- Ignore the pain (Z = -1.47, p = .142)

Appendix 6: Feminine Pain Response Summary (Chapter 6)

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Learning Task

Please read the following summary carefully. It includes details from a recent research study, which you will be asked to recall later on in this study. Please try to remember as much detail as possible. You have 2 minutes to do so.

Pain is no longer considered a purely physical experience. It seems that what we think and feel, as well as the wider social world we live in, can all affect our experience of pain, as well as what we choose to do about it.

One factor which has recently emerged as relevant to how we deal with pain is gender stereotypes -- what we expect men and women to typically do when in pain influences the choices we make when dealing with our own pain. For example, in the UK it generally seems that most women will use more feminine ways of coping with their pain- such as using social and emotional strategies to try to relieve their pain. These are seen as feminine as they involve sharing how they feel with others but do not disrupt their many social roles, which tend to be important to women.

Evidence supports this view. For example, a recent study found that 73% of women ask a female friend or relative for advice, or hug someone when they experience pain. The women said that this was because these are typically female things to do, to support one another and be open about their feelings.

It is seen as less acceptable for women to seek medical help, such as visiting a healthcare professional or taking painkillers. This is because this would require prioritising one's health over other social roles, which is not considered a very 'womanly' thing to do.

Furthermore, using typically 'masculine' behaviours to try and relieve pain is seen as even less acceptable, as they can pose a direct threat to femininity. For example, most women said they would never smoke cannabis or hit or break something to relieve their pain for this reason.

Taken together, this suggests that what is considered 'feminine' plays an important role in determining how most women choose to deal with their pain.

Appendix 7: Effective Pain Response Summary (Female Version) (Chapter 6)

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Learning Task

Please read the following summary carefully. It includes details from a recent research study, which you will be asked to recall later on in this study. Please try to remember as much detail as possible. You have 2 minutes to do so.

Pain is no longer considered a purely physical experience. It seems that what we think and feel, as well as the wider social world we live in, can all affect our experience of pain, as well as what we choose to do about it.

One factor which has recently emerged as relevant to how we deal with pain is pain relief stereotypes -- what we expect people to typically do when in pain influences the choices we make when dealing with our own pain. For example, in the UK it generally seems that most women will use 'normal' ways of coping with their pain- such as using strategies perceived as sensible and effective to try to relieve their pain. These are seen as normative as they will help get rid of the pain as quickly and easily as possible.

Evidence supports this view. For example, a recent study found that 73% of women take a painkiller or visit a healthcare professional when they experience pain. The women said that this was because this is how most people respond to pain, and it is instilled in everyone that this is what you should do.

It is seen as less acceptable for women to use strategies perceived as ineffective, such as playing with a pet or doing something sociable. This is because these are seen as 'riskier' strategies, as it is less likely that they would definitely remove the pain.

Furthermore, using typically 'harmful' behaviours to try and relieve pain is seen as even less acceptable, as they can cause more pain. For example, most women said they would never hit or break something or smoke a cigarette to relieve their pain for this reason.

Taken together, this suggests that what is considered 'effective' plays an important role in determining how most women choose to deal with their pain.

Appendix 8: Control Summary (Chapter 6)

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Learning Task

Please read the following summary carefully. It includes details from a recent research study, which you will be asked to recall later on in this study. Please try to remember as much detail as possible. You have 2 minutes to do so.

Technology is no longer used sparingly in our society. It seems that technology is now used to complete many everyday tasks, such as banking and food shopping. However, not all members of society feel comfortable using these technologies, including 'older people'.

One factor which has recently emerged as relevant to how older people use technology is stereotypes—the expectation that older people will struggle to use modern digital technologies makes them reluctant to try to use new technologies. For example, in the UK it generally seems that older adults avoid using technologies such as smartphones, laptops, and tablets. This avoidance is thought to be because of the embarrassment and frustration they feel when they struggle to use the technology for its purpose.

Evidence supports this view. For example, a recent study found that 73% of adults over the age of 80 do not own a smartphone. They said that this was because they could not complete simple tasks without asking for help, for example from younger relatives or advisors in stores selling the technological devices.

The older people did not think it was acceptable for them to seek help from technology advisors because they felt embarrassed at their lack of knowledge and understanding compared to the expertise of the advisor. They also worried about fulfilling the stereotype that old people can't use technology.

Furthermore, asking younger relatives for help with technology was seen as even less acceptable, as they did not want to burden their relatives. For example, most said they would prefer not to use smartphones than to ask their younger relatives for help for this reason.

Taken together, this suggests that stereotypes plays an important role in determining how older adults use technology, due to feelings of embarrassment and frustration, and an unwillingness to burden others.

Appendix 9: Masculine Pain Response Summary (Chapter 6)

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Learning Task

Please read the following summary carefully. It includes details from a recent research study, which you will be asked to recall later on in this study. Please try to remember as much detail as possible. You have 2 minutes to do so.

Pain is no longer considered a purely physical experience. It seems that what we think and feel, as well as the wider social world we live in, can all affect our experience of pain, as well as what we choose to do about it.

One factor which has recently emerged as relevant to how we deal with pain is gender stereotypes -- what we expect men and women to typically do when in pain influences the choices we make when dealing with our own pain. For example, in the UK it generally seems that most men will use more masculine ways of coping with their pain – such as using private, quick fix strategies to try to relieve their pain. These are seen as masculine as they do not express any weakness or vulnerability to others.

Evidence supports this view. For example, a recent study found that 73% of men ignore the pain or take a painkiller when they experience pain. The men said that this was because 'real men' should be able to ignore the pain and carry on, but if they can't do that then it is okay to take a painkiller.

It is seen as less acceptable for men to seek help from others, such as going to see a GP or another healthcare professional. This is because this would require talking to someone about your pain, which is not considered a very 'manly' thing to do.

Furthermore, using typically 'feminine' behaviours to try and relieve pain is seen as even less acceptable, because of the threat to masculinity. For example, most men said they would never use aromatherapy or seek counselling to relieve their pain for this reason.

Taken together, this suggests that what is considered 'masculine' plays an important role in determining how most men choose to deal with their pain.

Appendix 10: Effective Pain Response Summary (Male Version) (Chapter 6)

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Learning Task

Please read the following summary carefully. It includes details from a recent research study, which you will be asked to recall later on in this study. Please try to remember as much detail as possible. You have 2 minutes to do so.

Pain is no longer considered a purely physical experience. It seems that what we think and feel, as well as the wider social world we live in, can all affect our experience of pain, as well as what we choose to do about it.

One factor which has recently emerged as relevant to how we deal with pain is pain relief stereotypes -- what we expect people to typically do when in pain influences the choices we make when dealing with our own pain. For example, in the UK it generally seems that most men will use 'normal' ways of coping with their pain- such as using strategies perceived as sensible and effective to try to relieve their pain. These are seen as normative as they will help get rid of the pain as quickly and easily as possible.

Evidence supports this view. For example, a recent study found that 73% of men take a painkiller or visit a healthcare professional when they experience pain. The men said that this was because this is how most people respond to pain, and it is instilled in everyone that this is what you should do.

It is seen as less acceptable for men to use strategies perceived as ineffective, such as playing with a pet or doing something sociable. This is because these are seen as 'riskier' strategies, as it is less likely that they would definitely remove the pain.

Furthermore, using typically 'harmful' behaviours to try and relieve pain is seen as even less acceptable, as they can cause more pain. For example, most men said they would never hit or break something or smoke a cigarette to relieve their pain for this reason.

Taken together, this suggests that what is considered 'effective' plays an important role in determining how most men choose to deal with their pain.

Appendix 11: Results of pilot testing of female gender primes (Chapter 6)

Table A17.

Mean (SD) ratings of interest, ease of understanding, believability, masculinity, and femininity for the three female gender primes

	Interest	Ease of understanding	Believability	Masculinity	Femininity
Feminine	7.22 *(1.50)*	8.56 *(1.74)*	6.62 *(2.11)*	4.59 *(2.29)*	6.19 *(1.69)*
Effective	6.52 *(1.97)*	8.33 *(1.66)*	6.70 *(2.54)*	4.48 *(2.34)*	5.48 *(5.48)*
Control	6.63 *(1.88)*	8.37 *(1.96)*	6.74 *(2.12)*	4.48 *(2.34)*	3.96 *(2.08)*

Appendix 12: Results of pilot testing of male gender primes (Chapter 6)

Table A18.

Mean (SD) ratings of interest, ease of understanding, believability, masculinity, and femininity for the three male gender primes

	Interest	Ease of understanding	Believability	Masculinity	Femininity
Masculine	6.96 *(1.77)*	9.04 *(1.15)*	7.74 *(2.26)*	7.26 *(1.96)*	4.52 *(2.25)*
Effective	6.22 *(1.95)*	8.04 *(1.85)*	5.48 *(2.43)*	5.30 *(2.30)*	4.52 *(2.25)*
Control	6.57 *(1.73)*	8.87 *(1.39)*	7.13 *(1.82)*	4.17 *(2.61)*	3.70 *(2.03)*

Appendix 13: AsPredicted Pre-Registration (Chapter 6)

AsPredicted Pre-Registration

1) **Data collection.** Have any data been collected for this study already?

   ○ No, no data have been collected for this study yet.

   ◉ It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid **pre**-registration nevertheless.

2) **Hypothesis.** What's the main question being asked or hypothesis being tested in this study?
   Are pain behaviours (threshold, tolerance, intensity, likelihood of taking a painkiller and visiting healthcare professional) altered by exposure to gendered and normative pain relief stereotypes?
   The stereotypes used are sex-specific, so this study is broken down into two separate experiments, one studying the effects of female stereotypes on women, and one studying the effects of male stereotypes on men.

3) **Dependent variable.** Describe the key dependent variable(s) specifying how they will be measured.

   DV 1: Pain threshold will be measured in seconds and indicated by the participant at the moment they first experience the cold water as painful

   DV 2: Pain tolerance will be measured in seconds; the point at which a participant removes their hand from the cold water when they can no longer tolerate or endure the pain

   DV 3: Pain intensity will be self-reported by participants immediately after the pain task on a scale ranging from 0 (no pain at all) to 10 (pain could not be worse)

   DV 4: Pain anxiety will be self-reported by participants immediately after the pain task on a scale ranging from 0 (no anxiety at all) to 10 (anxiety could not be worse)

   DV 5: Likelihood to take a painkiller (if they experienced pain of that intensity on a regular basis) will be self-reported by participants on a 7-point scale ranging from 'Extremely unlikely' to 'Extremely likely'

   DV 6: Likelihood to visit a healthcare professional (if they experienced pain of that intensity on a regular basis) will be self-reported by participants on a 7-point scale ranging from 'Extremely unlikely' to 'Extremely likely'

4) **Conditions.** How many and which conditions will participants be assigned to?
   Participants in each experiment will be assigned to one of three conditions (3 between-groups conditions)**:**
   - gender stereotype related to pain relief (a typically 'masculine' stereotype for men and a typically 'feminine' stereotype for women)
   - normative stereotype related to pain relief (identical in content other than the sex referred to in the stereotype, which will be matched to participant sex)
   - control stereotype unrelated to gender or pain relief (identical content)

5) **Analyses.** Specify exactly which analyses you will conduct to examine the main question/hypothesis.

12 tests will be conducted, to test the effect of the IV on each DV for both men and women. The IV for all tests will be the condition, with the three levels stated previously. Four one-way ANOVAs will be conducted for men and four for women, with DVs 1-4 as the outcome. As the data for DVs 5 and 6 will be ordinal, Kruskal Wallis tests will be used.

6) **Outliers and Exclusions.** Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
Outliers will be identified visually on box plots and defined as standardised scores in excess of ±3.29. Based on the nature of the data, we suspect that any outliers will be the result of the variable having more extreme values than a normal distribution, in which instance the case will be retained but we would consider adjusting the value so that the case no longer has as much impact.

7) **Sample Size.** How many observations will be collected or what will determine sample size?
Based on Cohen's 1992 guidelines for a medium effect size for an ANOVA with 3 conditions, we will recruit 300 people in total (150 males for the 'male' version of the study, 150 females for the 'female' version) or until 30th June 2018 (whichever comes first)

8) **Other.** Anything else you would like to pre-register?
(e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
Secondary Analyses: Measures of conformity to masculine and feminine norms will be completed to see if these variables moderate the extent to which exposure to the stereotype influences responses to pain (DVs 1-6). Twelve multiple moderation linear regressions will be conducted using PROCESS for SPSS; six with data from male participants and six with data from female participants.
Variables collected as part of manipulation check: participants will be asked to rate how believable they found the vignette on a scale from 0 (not at all believable) to 10 (very believable). They will also be asked to rate how relevant they thought the vignette was to them from 0 (not at all relevant) to 10 (very relevant).
Variables collected for exploratory purposes: Participants will complete a new 'Gendered Pain Relief Scale' measuring the degree to which they perceive 62 ways of relieving pain as characteristic of the typical man or woman. This will not be used in any analyses as part of this project, but is collected as part of a separate project.

At the time of preregistration, 15 (5%) of participants have already been tested. A decision to preregister was taken at the point ethical approvals were gained, and data collection about to start. Due to the number of participants required and the proposed timeline for completion for the project, it was deemed necessary to begin data collection before submitting the pre-registration. None of the information contained here has changed from what was planned prior to data collection; this is clear given the small percentage tested compared to the total number required. As such, readers should consider this a valid pre-registration.

9) **Name.** Give a title for this AsPredicted pre-registration
The effects of exposure to gendered and normative pain relief stereotypes on pain responses, Bath, January 2018